

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>				1. CONTRACT ID CODE <b>DE-AC07-00ID13729</b>		PAGE 1 OF 3 PAGES	
2. AMENDMENT/MODIFICATION NO. <b>M001</b>		3. EFFECTIVE DATE <b>June 26, 2000</b>		4. REQUISITION/PURCHASE REQ. NO. <b>NOPR</b>		5. PROJECT NO. (If applicable)	
6. ISSUED BY <b>U.S. Department of Energy Idaho Operations Office Procurement Services Division 850 Energy Drive, MS 1221 Idaho Falls, ID 83401-1563</b>				7. ADMINISTERED BY (If other than Item 6) <b>Linda Rae Johnson, Contracting Officer (208) 526-2354</b>			
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and Zip Code)  <b>Foster Wheeler Environmental Corporation 3200 George Washington Way, Suite G Richland, WA 99352</b>				9A. AMENDMENT OF SOLICITATION NO.			
				9B. DATED (SEE ITEM 11)			
				10A. MODIFICATION OF CONTRACT/ORDER NO. <b>DE-AC07-00ID13729</b>			
CODE		FACILITY CODE		<b>X</b>		10B. DATED (SEE ITEM 13) <b>May 19, 2000</b>	
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning \_\_\_\_\_ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS;  
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO (Specify authority):	
THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.	
<b>X</b>	B. THE ABOVE-NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (Such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:	
D. OTHER (Specify type of modification and authority):	

E. IMPORTANT: Contractor **X** is not, \_\_\_ is required to sign this document and return [ ] copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible)

**The purpose of this modification is to incorporate administrative changes to the contract.**

**See continuation page.**

Except as provided herein, all terms and conditions of the document referenced in Items 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)  <b>NO SIGNATURE REQUIRED</b>		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) <b>LINDA RAE JOHNSON Contracting Officer</b>	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
BY _____ (Signature of person authorized to sign)		BY <u>Linda Rae Johnson</u> (Signature of Contracting Officer) <b>8/10/00</b>	

This modification makes the following changes to the contract.

1. Block 2 of the SF 33 is changed as follows:

FROM: DE-AC07-99ID13729 TO: **DE-AC07-00ID13729**

2. Section C Attachment C-A-F change title page as follows:

FROM: Repository Criteria TO: **SECTION C  
REPOSITORY CRITERIA**

3. Section G, page G-2 item G.4 is changed as follows:

U.S. Department of Energy	<b>Telephone: 208-526-2354</b>
Idaho Operations Office	<b>Fax: 208-526-5548</b>
Procurement Services Division	<b>E-mail: johnsolr@id.doe.gov</b>
ATTN: <b>Linda Rae Johnson</b>	
850 Energy Drive, <b>MS 1221</b>	
Idaho Falls, ID 83401-1563	

4. Section G, page G-3 item G.6 second address change the ATTN: line as follows:

FROM: ATTN: (Provided by Separate Letter)  
TO: **Linda Rae Johnson**

5. Section G, page G-4 item G.6 change COR information as follows:

FROM: ATTN: (Provided by Separate Letter)  
TO: ATTN: **Francis G. Schwartz**

FROM: 850 Energy Drive, MS (Provided by Separate Letter)  
TO: 850 Energy Drive, **MS 1117**

6. Section H., page H-7 **delete clause H-17** in its entirety.

7. Make the following changes to Section J, Attachments, Table of Contents:

FROM:	TO:
J-A Davis Bacon Wage Rate 1998	<b>J-A Davis Bacon Wage Rate</b>
J-B Service Contract Wage Rates 1998	<b>J-B Service Contract Wage Rates</b>
J-C Site Service Information	<b>J-C Site Services Information</b>
J-J Applicable DOE Directives	<b>J-J Applicable DOE Directives and Documents</b>
J-K Deliverables	<b>J-K Submittal &amp; Deliverables Section</b>
J-O Small Business, Small Disadvantaged, And Women Owned Business Subcontracting Plan	<b>J-O Small Business, Small Disadvantaged and Women Owned Business Subcontracting Plan</b>

8. Section J-D **incorporate the DOE-ID A/E STANDARDS (294 pages)** (through revision 25) and delete the web site <http://www.inel.gov/resources/aem/aesthome.html>.

9. Section J Attachment J-E page 2 change item A. as follows:

FROM: ATTN: Brad G. Bauer, Contracting Officer  
TO: ATTN: **Linda Rae Johnson**, Contracting Officer

10. Section J Attachment J-F add the following:

<b>ISF</b>	<b>Idaho Spent Fuel Project</b>
<b>ISF</b>	<b>Idaho Spent Fuel Facility</b>
<b>ISFSI</b>	<b>Total Facility</b>
<b>Receipt Area</b>	<b>(formerly Dry Transfer Facility Cask Receipt)</b>
<b>Transfer Area</b>	<b>(formerly Dry Transfer Facility)</b>
<b>Storage Area</b>	<b>(formerly ISFSI)</b>

11. Section J, Attachment J-H, **incorporate DOE/ID 10381**, "Idaho National Engineering and Environmental Laboratory, Reusable Property, Recyclable Materials, and Waste Acceptance Criteria", Revision 9, effective March 30, 1999 in its entirety. Delete in their entirety the four paragraphs from Attachment J-H

12. Section J, Attachment J-K change item 4 Fuel movement plan as follows:

**SUBMITTAL & DELIVERABLES SCHEDULE**  
FROM: No later than 3 months from effective date of Contract award  
TO: **One year prior to planned start of operations**

13. Section J, Attachment J-M delete the web sites and in their place **incorporate the 87 pages** of information found at:

<http://www.id..doe.gov/doeid/m&o/PDF/OCAWA/AppendixC.pdf>  
<http://www.id..doe.gov/doeid/m&o/PDF/OCAWA/Appendixb.pdf>  
<http://www.id..doe.gov/doeid/m&o/PDF/OCAWA/ssappena.pdf>  
<http://www.id..doe.gov/doeid/m&o/PDF/OCAWA/Agreement.PDF>  
<http://www.id..doe.gov/doeid/m&o/PDF/OCAWA/Site%20ConstructionAg.PDF>

14. **All other terms and conditions remain unchanged.**

(End of Continuation Page)

**Section J**  
**Attachment J-D**  
**DOE-ID A/E STANDARDS**



**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS**TITLE: FORWARD  
DATE: August 1998**FOREWORD****Organization of the Standard**

This standard is separated into divisions consistent with CSI MASTERFORMAT organization. All possible section numbers are not included. For this reason section numbering is not necessarily sequential.

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Each major heading is numbered, titled in upper case letters and bolded.

"0110-1. APPLICABLE CODES AND STANDARDS" is an example of a major heading.

Each paragraph beneath a major heading is numbered for easy reference. Minor headings are numbered, titled in lower case letters, bolded and underlined. "**2.2 Rest Room Facilities**" is an example of a minor heading. Paragraphs beneath and relating to the minor heading are identified by a lower case letter in parenthesis (ie. (a), (b), etc.).

**Revision Methodology**

See Section 0050 for requirements for revisions to this standard.

**Standard Custodian**

The custodian of the DOE-ID Architectural Engineering Standards is the AE Standards Committee Chairman. The current chairman is Scott Jensen. He can be reached at (208) 526-0544 or email [saj5@inel.gov](mailto:saj5@inel.gov).

Contact LMITCO Document Control, MS 3640, (208) 526-1201, email [stu@inel.gov](mailto:stu@inel.gov) regarding changes or problems with the distribution of this manual.

## ACRONYMS

AASHTO	American Association of State Highway & Transportation Officials
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ADS	Activated Denial System
AE	Architect Engineer
AES	DOE-ID Architectural Engineering Standards
AFC	Approved for Construction
AFM	Air Force Manual
AGMA	American Gear Manufacturers Association
AHJ	Authority Having Jurisdiction
AIHA	American Industrial Hygienists Association
AISC	American Institute of Steel Construction
ALARA	As low as reasonably achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
API	American Petroleum Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Waterworks Association
B&PVC	Boiler and Pressure Vessel Code
BUR	Built-Up Roofing
C&AO	Communications and Alarms Organization
CAD	Computer-aided drafting
CC	Construction Component
CCTV	Closed-Circuit Television
CDR	Conceptual Design Requirement
CE	Conditioning Engineer
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CERL	Corps of Engineers Construction Engineering Research Lab
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CG	Centers of Gravity
CID	Construction Interface Document
CM	Construction Manager
CMAA	Crane Manufacturers Association of America
CPM	Critical Path Method
CPU	Central Processing Unit
CRT	Cathode Ray Tube
CSCC	Central Security Control Center
CSI	Construction Specifications Institute
DAR	Document Action Request
DBA	Design Basis Accident

DC	Document Control
DD	Degree-day
DBE	Design Basis Earthquake
DBT	Design Basis Tornado
DOE	Department of Energy
DOE-ID	Department of Energy - Field Office Idaho
DOP	Detailed Operating Procedure
EA	Environmental Assessment
ECM	Engineering Configuration Management
EDMS	Microfilm System
EIS	Environmental Impact Statement
EMCS	Energy Monitoring and Control System
EMT	Electric metallic tubing
EPDM	Ethylene propylene diene monomer
ERDA	U.S. Energy Research & Development Administration (now DOE)
FAA	Federal Aviation Administration
FHA	Fire Hazards Analysis
FM	Factory Mutual
FPE	Fire Protection Engineer
GFE	Government-furnished equipment
GFCI	Ground-fault circuit-interrupters
GPP	General Plant Project
HEPA	High Efficiency Particulate Atmosphere
HVAC	Heating, Ventilation, & Air Conditioning
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
ICPP	Idaho Chemical Processing Plant
IEEE	Institute of Electronics Engineers
IES	Illuminating Engineering Society
IGES	Initial Graphics Exchange Specification
IMC	Intermediate metal conduit
INEL	Idaho National Engineering Laboratory
IRI	Industrial Risk Insurers
ISA	Instrument Society of America
IVMRP	Industrial Ventilation Manual of Recommended Practice
LCC	Life cycle cost
LMITCO	Lockheed Martin Idaho Technologies Company
LPG	Liquefied Petroleum Gas
MBMA	Metal Builders Manufacturer's Association
MCFL	Maximum Credible Fire Loss
MIL SPEC	Military Specification
MPFL	Maximum Possible Fire Loss
NACE	National Association of Corrosion Engineers
NAVFAC	Naval Facilities
NBS	National Bureau of Standards
NDE	Nondestructive examination
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act

NESC	National Energy Software Center
NFPA	National Fire Protection Association
NICET	National Institute for Certification of Engineering Technologies
NRCA	National Roof Contractors Association
NRP	Nonrising hinge pins
NSF	National Sanitation Foundation
NTIA	National Telecommunications and Information Administration
OC	Operating Contractor
OSHA	Occupational Safety and Health Administration
PBF	Power Burst Facility
P&ID	Piping and Instrument Drawings
P.C.	Performance Category
PCB	Polychlorinated Biphenyl
PERT	Program Evaluation Review Technique
PIV	Post Indicator Valve
PIVA	Post Indicator Valve Assembly
PM	Project Manager
PPS	Plant Protective Systems
PVC	Polyvinyl chloride
QA	Quality Assurance
QAP	Quality Assurance Plan
QPP	Quality Program Plan
RCG	Radioactivity Concentration Guide
RCRA	Resource Conservation Recovery Act
RWMC	Radioactive Waste Management Complex
REA	Rural Electrification Administration
R.G.	Regulatory Guide
SACS	Security Alarm Control System
SAR	Safety Analysis Report
SDI	Steel Door Institute or Steel Deck Institute
SFA	Single Failure Analysis
SFPE	Society of Fire Protection Engineers
SIRS	Software Information Research Sharing
SJI	Steel Joists Institute
SMACNA	Sheet Metal & Air Conditioning Contractors National Association
SNM	Society for Nuclear Medicine
SNM	Special Nuclear Material
SO	Systems Operations
SPRI	Single Ply Roofing Institute
TAN	Test Area North
TIMA	Thermal Insulation Manufacturers Association
TLV	Threshold Limit Value
TRA	Test Reactor Area
UBC	Uniform Building Code
UL	Underwriters' Laboratories
USNRC	U.S. Nuclear Regulatory Commission
UV	Ultraviolet
VMF	Vehicle Monitoring System
ZPA	Zero Period Acceleration

DOE-ID ARCHITECTURAL ENGINEERING STANDARDS	TITLE: CONTENTS		
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## **DIVISION 9--FINISHES**

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## **DIVISION 10--SPECIALTIES**

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## **DIVISION 12--FURNISHINGS**

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AE	Architect Engineer	
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AFC	Approved for Construction	
AFM	Air Force Manual	
AGMA	American Gear Manufacturers Association	
AHJ	Authority Having Jurisdiction	
AIHA	American Industrial Hygienists Association	
AISC	American Institute of Steel Construction	
ALARA	As low as reasonably achievable	
ANS	American Nuclear Society	
ANSI	American National Standards Institute	
API	American Petroleum Institute	
ARMA	Asphalt Roofing Manufactures Association	
ASCE	American Society of Civil Engineers	
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers	
ASME	American Society of Mechanical Engineers	
ASTM	American Society for Testing and Materials	
AWS	American Welding Society	
AWWA	American Waterworks Association	
B&PVC	Boiler and Pressure Vessel Code	
BUR	Built-Up Roofing	
C&AO	Communications and Alarms Organization	
CAD	Computer-aided drafting	
CC	Construction Component	
CCTV	Closed-Circuit Television	
CDR	Conceptual Design Requirement	
CE	Conditioning Engineer	
CERCLA	Comprehensive Environmental Response Compensation & Liability Act	
CERL	Corps of Engineers Construction Engineering Research Lab	
CFA	Central Facilities Area	
CFR	Code of Federal Regulations	
CG	Centers of Gravity	
CID	Construction Interface Document	
CM	Construction Manager	
CMAA	Crane Manufacturers Association of America	
CPM	Critical Path Method	
CPU	Central Processing Unit	
CRT	Cathode Ray Tube	
CSCC	Central Security Control Center	
CSI	Construction Specifications Institute	
DAR	Document Action Request	
DBA	Design Basis Accident	

DC	Document Control
DD	Degree-day
DBE	Design Basis Earthquake
DBT	Design Basis Tornado
DOE	Department of Energy
DOE-ID	Department of Energy - Field Office Idaho
DOP	Detailed Operating Procedure
EA	Environmental Assessment
ECM	Engineering Configuration Management
EDMS	Microfilm System
EIS	Environmental Impact Statement
EMCS	Energy Monitoring and Control System
EMT	Electric metallic tubing
EPDM	Ethylene propylene diene monomer
ERDA	U.S. Energy Research & Development Administration (now DOE)
FAA	Federal Aviation Administration
FHA	Fire Hazards Analysis
FM	Factory Mutual
FPE	Fire Protection Engineer
GFE	Government-furnished equipment
GFCI	Ground-fault circuit-interrupters
GPP	General Plant Project
HEPA	High Efficiency Particulate Atmosphere
HVAC	Heating, Ventilation, & Air Conditioning
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
ICPP	Idaho Chemical Processing Plant
IEEE	Institute of Electronics Engineers
IES	Illuminating Engineering Society
IGES	Initial Graphics Exchange Specification
IMC	Intermediate metal conduit
INEL	Idaho National Engineering Laboratory
IRI	Industrial Risk Insurers
ISA	Instrument Society of America
IVMRP	Industrial Ventilation Manual of Recommended Practice
LCC	Life cycle cost
LMITCO	Lockheed Martin Idaho Technologies Company
LPG	Liquified Petroleum Gas
MBMA	Metal Builders Manufacturer's Association
MCFL	Maximum Credible Fire Loss
MIL SPEC	Military Specification
MPFL	Maximum Possible Fire Loss
NACE	National Association of Corrosion Engineers
NAVFAC	Naval Facilities
NBS	National Bureau of Standards
NDE	Nondestructive examination
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act

NESC	National Energy Software Center
NFPA	National Fire Protection Association
NICET	National Institute for Certification of Engineering Technologies
NRCA	National Roof Contractors Association
NRP	Nonrising hinge pins
NSF	National Sanitation Foundation
NTIA	National Telecommunications and Information Administration
OC	Operating Contractor
OSHA	Occupational Safety and Health Administration
PBF	Power Burst Facility
P&ID	Piping and Instrument Drawings
P.C.	Performance Category
PCB	Polychlorinated Biphenyl
PERT	Program Evaluation Review Technique
PIV	Post Indicator Valve
PIVA	Post Indicator Valve Assembly
PM	Project Manager
PPS	Plant Protective Systems
PVC	Polyvinyl chloride
QA	Quality Assurance
QAP	Quality Assurance Plan
QPP	Quality Program Plan
RCG	Radioactivity Concentration Guide
RCRA	Resource Conservation Recovery Act
RWMC	Radioactive Waste Management Complex
REA	Rural Electrification Administration
R.G.	Regulatory Guide
SACS	Security Alarm Control System
SAR	Safety Analysis Report
SDI	Steel Door Institute or Steel Deck Institute
SFA	Single Failure Analysis
SFPE	Society of Fire Protection Engineers
SIRS	Software Information Research Sharing
SJI	Steel Joists Institute
SMACNA	Sheet Metal & Air Conditioning Contractors National Association
SNM	Society for Nuclear Medicine
SNM	Special Nuclear Material
SO	Systems Operations
SPRI	Single Ply Roofing Institute
TAN	Test Area North
TIMA	Thermal Insulation Manufacturers Association
TLV	Threshold Limit Value
TRA	Test Reactor Area
UBC	Uniform Building Code
UL	Underwriters' Laboratories
USNRC	U.S. Nuclear Regulatory Commission
UV	Ultraviolet
VMF	Vehicle Monitoring System
ZPA	Zero Period Acceleration

**0010-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- Not applicable for this section. See AES 0100-1 for a discussion of the method of addressing applicable codes and standards in each Section of this document.

**1.2 Reference Codes and Standards**

- DOE 430.1, Directive on Life Cycle Asset Management

**0010-2. PURPOSE OF THE DOE-ID ARCHITECTURAL ENGINEERING STANDARDS**

- 2.1 These AE Standards identify the appropriate local, state, regional and national codes to which physical assets shall be designed and constructed as required by DOE 430.1. General design criteria for all DOE facilities are provided in the national codes and standards referenced herein or in project specific design criteria. This AE Standard is provided as a clarification to the national codes and standards and contains more detailed design criteria specific to DOE-ID facilities. The clarifications may include regulatory interpretations, rulings or allowances. These Standards provide owners direction on code allowed options. They occasionally restrict options where environmental, safety, health or life cycle cost considerations apply.
- 2.2 The AE Standards provide technical direction and requirements to designers for construction or modification of facilities at the INEEL and other locations under the direction of DOE-ID. Design work may be performed internally by the Operating Contractor (OC) or externally through an outside AE contract. The contract may be administered by the OC or directly by DOE.
- 2.3 These AE Standards, supplemented by project specific requirements, establish and document owner responsible decisions for some basic considerations such as cost versus value or benefit, level of acceptable risk, required maintenance and quality of work. They provide for application of consistent design criteria for standard features at DOE-ID facilities.
- 2.4 The AE Standards capture natural phenomena design criteria as approved by the DOE-ID Natural Phenomena Committee. They provide local site information such as temperature, frost depth, and design basis storms.

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- 2.5 The AE Standards capture lessons learned from design and construction of past projects or incidents.
- 2.6 The AE Standards identify criteria that may apply to specific types of DOE facilities that are not fully addressed in the national codes and standards. Nuclear facilities are an example of this.

### **0010-3. SCOPE AND APPLICATION**

- 3.1 These criteria apply to any building acquisition, new facility, facility addition and alteration, and leased facility. This includes on-site constructed buildings, pre-engineered buildings, and plant-fabricated modular buildings. See Appendix K for criteria for relocatable structures and temporary facilities. For existing facilities, original design criteria apply to the structure in general; however, additions or modifications shall comply with this standard and the associated latest editions of the references herein.
- 3.2 All new construction and modifications at the INEEL must comply with the applicable DOE Orders, including DOE-ID supplements, and with the applicable national consensus codes and standards. Codes and standards listed as "Applicable" in each section shall apply unless otherwise indicated by a specific reference herein or in the project Design Criteria. Regulations, codes and standards may be included by listing a Section of the AES which lists or references them. Codes and standards listed as "Referenced" shall apply to the extent designated in the section. Leased facilities must also comply with local codes and requirements of the local authority having jurisdiction.



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- 3.3 Codes and Standards cited in this manual shall be the latest revision at the time of bid for construction, unless otherwise specified in the project design criteria.
- 3.4 The criteria in this manual are generally based on national codes and standards. For nuclear facilities, the criteria are based on more stringent standards. In some cases, where codes and standards allow alternatives, a specific alternative is identified herein based on past experience at the INEEL. Lessons learned and regulatory interpretations are also included when appropriate.

#### 0010-4. GENERAL VS. NUCLEAR FACILITY REQUIREMENTS

- 4.1 While some criteria applying to nuclear facilities are included within this standard, the specific requirements for nuclear or hazardous facilities will be addressed in the specific project design criteria. Nuclear facilities are defined as those whose operations involve fissionable or radioactive materials in such a form and quantity that a significant potential health hazard exists to the employees or the general public.
- 4.2 As part of the design process, the AE should identify any potential nuclear or other hazard that may occur during construction or operation of the facility being designed that has not been addressed in the project design criteria. These potential hazards shall be brought to the attention of DOE-ID and the OC for resolution

#### 0010-5. CONFLICTS AND WAIVERS

- 5.1 **Conflicts** If a conflict that significantly impacts project cost, safety, or quality is identified between any of the referenced standards or codes, the project design criteria, or this document, the AE shall bring it to the attention of DOE-ID and the OC for resolution. Generally, where a minor conflict occurs between the AE Standards and the referenced codes and standards, the AE Standards shall govern.
- 5.2 **Waivers** The AE shall also identify any seemingly restrictive design criteria which significantly increase the project cost but do not produce significant benefits or when there is strong justification for not meeting a requirement specified herein. These items shall also be brought to the attention of DOE-ID and the OC. Where conditions warrant, a waiver from requirements may be granted by the DOE-ID representative on the AE Standards Committee, who will coordinate the waiver internally with DOE-ID. A form, to be used in applying for a waiver, is Form L-0431.27# and can be obtained from the OC. A copy of the form is included in Appendix A.

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- 5.3 Waivers to Appendix M Waivers to the requirements of Appendix M may be approved by appropriate facility representatives. See the Preface of Appendix M for more information.

**0010-6. AVAILABLE SERVICES**

- 6.1 **Weather Data** Extensive information on weather, including data on rainfall, wind patterns, and temperature, is available from DOE-ID upon request. DOE-ID-12118, Climatology of the Idaho National Engineering Laboratory, second edition Dec. 1989 contains detailed information. The U.S. National Oceanic and Atmospheric Administration maintains a data-gathering station at the INEEL.
- 6.2 **Environmental Data** The environmental criteria (snow load, etc.) contained herein are for the INEEL. Environmental criteria for other geographical locations will be provided in the specific design criteria for each project. Significant and extensive environmental data are available in areas such as geology, hydrology, seismology, soils, topography, sociology, demographics, meteorology, and climatology. These data are typically used in the preparation of Environmental Impact Statements or Environmental Assessments and have often been developed in accordance with the NEPA guidelines. This type of data is available to the AE and should be considered prior to extensive development of new information. Documents which contain this type of information include the following:
- EG&G-NPR-6688, Idaho National Engineering Laboratory Environmental Characterization Report (three Volumes, September 1984)
  - DOE/ID 10401, Site Facilities and Infrastructure
  - DOE/ID 10514, Comprehensive Facility and Land Use Plan

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**0020-1. CODES AND STANDARDS**

- c See AES 0100-1 for applicable codes and standards.

**0020-2. PURPOSE AND SCOPE**

- 2.1 The AE shall provide design services, reports, and records in accordance with the negotiated contract Scope of Work. A Scope of Work will be prepared by the OC for each project. Items that are usually considered in the Scope of Work are outlined in this section. A generic AE Scope of Work suitable for small-to medium-sized jobs is included in Appendix B for use and/or reference.
- 2.2 Design objectives shall be: (a) achieving minimum construction costs consistent with programmatic, environmental, security, safety requirements, and accessibility by the disabled; (b) achieving technical adequacy; (c) achieving optimum economy in operation and maintenance; (d) assuring that appropriate consideration is given to the expected period of use, sound construction practices, quality assurance requirements, energy conservation requirements, and the appearance of completed facilities; and (e) trade-off studies, an essential part of the design effort required to achieve these objectives.
- 2.3 When a Quality Assurance Plan (QAP) is required as part of the contract, the AE shall submit for approval a QAP setting forth his quality assurance program, including design procedures, checking procedures, design control, document control, and design verification to be used during the contract services.
- 2.4 The following are general requirements and work to be performed as part of the AE design services. Specific work to be performed and reports and records to be compiled shall be determined and specified in the design subcontract Scope of Work.
- 2.5 The AE will also be provided with specific design criteria for each project.
- 2.6 The AE shall be responsible for ensuring that the design meets applicable government regulations, the requirements set forth in this document, and the specific project design criteria. The AE shall also use design methods which provide cost-effective facilities, based on life cycle costing, without compromising personnel and property safety.
- 2.7 This standard is written to assist the AE in developing specific designs for a particular project. Preliminary safety and environmental assessments will be performed during the development of the project design criteria to help ensure that the requirements are adequate to produce a design which conforms to the applicable environmental, safety, and health protection standards. More detailed safety and environmental analyses will be required on some projects during the design cycle.

**0020-3. CONCEPTUAL DESIGN**

- 3.1 Conceptual designs shall be performed in accordance with conceptual design criteria and/or Scope of Work that are provided to the AE for the specific project. Conceptual designs are:

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(a) to develop project scope, (b) to develop cost estimates, (c) develop alternatives and (e) to develop resource schedules.

### 3.2 The AE Scope of Work may require the AE to:

- (a) Establish general and specific criteria, design parameters, applicable codes and standards, and quality requirements, including quality levels of major items as directed.
- (b) Establish space allocations for various functions including space for accessibility/egress for the disabled.
- (c) Establish piping, mechanical, and HVAC flow diagrams and general layout drawings.
- (d) Establish electrical one-line diagrams.
- (e) Establish types of construction, significant features and components, and building and facility utility services.
- (f) Establish security, environmental protection, decontamination, safety, and pollution prevention/waste minimization requirements.
- (g) Establish project cost estimates, schedules, and methods of accomplishment.
- (h) Identify specialty or long-lead procurement items that may need to be listed as government-furnished items.
- (i) Conduct soils investigation, geotechnical, etc., to support footing design, response spectra, etc. (If this work is more appropriate as part of a later design effort, it should be so stated in the Conceptual Design Report.)
- (j) Scope environmental and safety issues including permit requirements and required information to support NEPA and other regulations as appropriate. Include schedules and data required to support schedules.
- (k) A site review should be included as part of the conceptual effort to verify conditions including accuracy of as-builts, potential contamination, and operational interfaces/interferences
- (l) Identify quality related items requiring special control.

## 0020-4. PRELIMINARY DESIGN (TITLE I) WORK

4.1 The preliminary stage of project design uses the Conceptual Design and Scope of Work, as the baseline from which preliminary design is performed. The AE Scope of Work may require the AE to:

- (a) Prepare time schedules for the performance of preliminary design, drawings, and specifications. Critical logic ties shall be identified for at least the design critical path.

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- (b) Conduct or arrange for and supervise all necessary topographical and other field surveys, the preparation of maps, and necessary test borings and other subsurface investigations. Much of this information is available from the OC. The AE shall contact the OC prior to undertaking work of this nature for current information.
- (c) Consult and collaborate with the OC to determine the detailed design requirements.
- (d) Conduct preliminary studies and value engineering evaluations to determine, both operationally and economically, the best approach for the design. These various studies and value engineering recommendations shall be submitted for review and approval, from which a design option will be selected for continued work.
- (e) Conduct onsite field determinations and measurements to determine site and as-built conditions for work requiring possible tie-ins. All appropriate existing underground lines shall be shown on the drawings prepared by the AE. Location of underground utilities will be provided by the OC.
- (f) Prepare sufficient drawings to indicate location, size, general interior arrangements, foundation layout, type (electrical, process, and utility systems), flow diagrams (single-line drawings for some parts are acceptable), etc. General or detailed specifications, basis used in design (design data sheets), and results of studies shall be included.
- (g) Prepare an initial draft of progress schedules for definitive engineering drawings and specifications. This should be accomplished prior to completion of preliminary design.
- (h) Prepare estimate of cost for definitive detailed design, including drawings and specifications. This should be accomplished prior to completion of preliminary design.
- (i) Prepare a list of long-lead procurement items with estimated delivery period as soon as information is available, but prior to completion of preliminary design services. Identify items that need to be listed as GFE so that project need dates can be met. Submit the long-lead item and GFE lists for approval. Prepare detailed technical documents for procurement of those items.
- (j) Prepare a time schedule for construction work if required by the Scope of Work. Bar graphs shall be used unless a network is specifically required.
- (k) Prepare necessary design and progress reports. Specific requirements must be included in the "Deliverables" section of the Scope of Work.
- (l) Prepare estimates of cost for construction, with detailed backup information, in accordance with the INEL Cost Estimating Guide, when specifically required by the project documents.

**0020-5. DEFINITIVE DESIGN (TITLE II) WORK**

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- 5.1 Definitive design is based upon the preliminary design, scope of work and the project design criteria. It is the final detail design of the construction project. The drawings and specifications shall be in sufficient detail that the work intended can be performed by a Construction Subcontractor. Prior to issue of final drawings and specifications, the AE shall make onsite reviews to eliminate errors and omissions.
- 5.2 The AE Scope of Work may require the AE to:
- (a) Review and incorporate preliminary design review comments.
  - (b) Maintain up-to-date information on engineering drawing and specification progress schedules.
  - (c) Furnish approved technical documents for GFE. Maintain up-to-date information for long-lead procurement items.
  - (d) Furnish approved drawings and specifications for construction.
  - (e) Prepare estimates of the cost for construction, with detailed backup information, in accordance with the INEL Cost Estimating Guide. The AE shall continue to furnish revised cost estimates until completion of definitive design. Since the size, complexity, length of time required for design, etc., vary appreciably for different jobs, the requirement and timing for interim cost estimates will be determined at the time of negotiations. The revised estimate shall reflect any additional design changes or cost data which have become available during the period. An itemized list of major changes with reasons shall accompany each estimate.
  - (f) Prepare a time schedule for construction. This schedule shall be broken down into major items of work using bar graph marking to show estimated construction periods. Delivery of GFE shall also be shown. The cover sheet shall list items of critical delivery time with the AE's estimate of delivery time. The schedule shall be submitted with completed drawings and specifications. Bar graphs shall be used unless a network is specifically required.
  - (g) Prepare and submit Design Files.
  - (h) Prepare necessary design and progress reports (as required by the Design Contract).
  - (i) Prepare vendor data submittal requirements and a list of GFE (Schedule X) on forms provided.
  - (j) Prepare and assemble lists of all numbered items: equipment, valves, instruments, pipelines, etc.
  - (k) For designs involving nuclear, the process, critical components, and the P&IDs should be put under some form of configuration control.

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- (l) The specifications or contract documents should include critical inspection (Title III) issues including any hold points.
- (m) Prepare or require Operating and Maintenance Manuals. The completed manuals are required as soon as all information to be included is available, but prior to completion of construction.

**5.3 Component/System Verification** Component and system verification for process facilities will be identified by the OC or DOE-ID in the project design criteria. The AE, if requested, shall prepare separate test procedures describing the criteria to be performed for testing and checkout and identify all tests to be completed by the Construction Subcontractor. Construction component tests will normally be performed by the Construction Subcontractor under the surveillance of the Contractor's Representative. The AE shall clearly identify in the specifications all testing to be performed by the Construction Subcontractor. If requested, the AE shall define the system operations tests necessary to verify compliance with approved drawings and specifications.

#### **0020-6. AE FIELD SUPPORT (TITLE II FOLLOW-ON)**

- 6.1** In some cases, the AE may be assigned engineering work during the construction and startup phases of the project. The AE Scope of Work may require the AE to:
  - (a) Assist in analyzing and evaluating proposals and bids for materials, equipment, and services required for construction.
  - (b) Check, evaluate, and review shop drawings, equipment, materials, etc., as submitted by the Construction Subcontractor to ensure conformity with the approved design, working drawings and specifications. Revisions to approved drawings and specifications shall not be made by comments on vendor submittals.
  - (c) Prepare and furnish estimates of cost for approved design changes or discrepancies after award of the construction subcontract.
  - (d) For lump-sum construction subcontracts, prepare and furnish revised drawings and specifications and correct design errors, omissions, discrepancies, construction changes, etc., discovered after award of the construction subcontract.
  - (e) Consult with and advise the OC on any questions which may arise during construction of the project.
- 6.2** If the AE is given inspection and as-building responsibility, AE Scope of Work should require the AE to:
  - (a) Perform field inspection services.

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- (b) Prepare "red-line" as-built drawings.
- (c) Prepare final as-built drawings showing project configuration as constructed.

**0020-7. DESIGN FILES**

- 7.1 As part of the engineering work, the AE shall prepare a design file which shall include all design data, studies, and computations prepared or incorporated into the design of the project. Data and calculations generated throughout the design of the project must be adequate, complete, correct, and comprehensive so that the information may be compiled in a satisfactory design file (end product). The designer's reasoning and the steps carried out in his calculations shall be auditable and easily followed. All material incorporated into the file shall be representative of the basis for the final design as well as the final design. Information secured from other sources and used in the calculations generated should be stated or properly referenced as to the source. Specific additional requirements may be included in the Scope of Work.

**0020-8. SYSTEM OPERATING MANUALS AND FLOW SHEETS**

- 8.1 The AE shall prepare operating manuals, including system flow sheets, only for those systems requested. Flow sheets incorporated into the manual may be reduced copies of the original design drawings if the reduction is easily readable and understandable. New, simplified flow sheets will be required if the above conditions cannot be met. The operating manuals shall include comprehensive descriptions covering the required systems. Vendor-designed equipment (demineralizers, diesel generators, etc.) may require reproduction and reduction of the vendor's key flow sheet to complete the description of a system.
- 8.2 The operating manual shall state the principles and means of operation and care of equipment and structures and shall include ratings and capacities of equipment, limitations, precautions to be observed, and adjustments and settings, particularly of protective devices. The operating manual shall show the functional interrelationship of the pieces of equipment in a system. All equipment, pipelines, valves, instruments, and vessels shall be identified by numbers established on drawings. The manual must contain descriptions of operating sequences in order to portray the designer's intended use of the systems or facilities, with particular emphasis on procedures for startup, operation under both normal and abnormal conditions, and shutdown. By reference thereto, the operating manual shall take advantage of detailed descriptions of items of equipment contained in manufacturers' instructions which will be available to operating personnel. Each key vendor equipment item shall be cross-referenced to its plant equipment number, vendor's name, purchase order number, and specification number.
- 8.3 These manuals are not intended as final, step-by-step plant operating procedures.



**0030-1. CODES AND STANDARDS****1.1 Referenced Codes and Standards**

- ANSI Y14.1, Drawing Sheet Size and Format

**0030-2. FORMAT****2.1 Materials**

- (a) CAD generated drawings shall be prepared on bond, high quality vellum or mylar.
- (b) Drawing prints shall be black or blue line on white paper of good print quality and durability.

**2.2 Size and Format** Drawing size and format shall conform to ANSI Y14.1. See the sample drawing in Appendix C.

- (a) All drawings for construction subcontracts, except piping isometric drawings and instrument loop diagrams, shall be on standard 22 x 34 in. (D size) sheets unless approval for a different standard size is obtained from the OC. Sheet sizes for piping isometric drawings and instrument loop diagrams shall be as directed in the Scope of Work or the contract documents. Standard sheet sizes are:
  - A size, 8-1/2 x 11 in.
  - B size, 11 x 17 in.
  - C size, 17 x 22 in.
  - D size, 22 x 34 in.
  - E size, 34 x 44 in.
  - F size, 28 x 40 in.
- (b) All drawings for a given construction project, except as noted above, shall be of the same size. (11x 17 in. copies may be used for review and bidding with OC approval.)
- (c) Use of multi-sheet drawings will require specific approval.
- (d) The AE shall provide locating coordinates in the drawing margin. See Appendix C.
- (e) The revision block shall be located against the right margin of the drawing.

**2.3 Title Blocks**

- (a) Title blocks shall be similar to the sample contained in Figure 0030-1 and must contain the same salient information.
- (b) Approval and revision blocks shall include space for OC approvals.

**0030-3. PREPARATION**

- 3.1 General Requirements Construction drawings shall consist of a complete set of individual drawings which graphically describe the required construction work for a given project. For modifications to existing facilities, the AE may be required to show the new construction using existing as-built drawings or half-tones of the existing facilities.
- 3.2 The AE shall use the standard drawings and details listed in Appendix D in the development of drawings, except when otherwise directed. These standard drawings are available from the OC. Where possible, drawings should be developed and grouped to support anticipated bid packages. Unless they are part of a design-build package, the construction drawings, in conjunction with the specifications, shall be of sufficient detail that no further design engineering is required by the CS, yet not so detailed as to be overly restrictive or to eliminate planning functions normally performed by the CS, such as material takeoff, job layout, shop detailing, etc. Examples of the detail information generally required on drawings are:
- (a) Location and details for concrete embedments, blockouts, and penetrations.
  - (b) Location and details for absorbers and HEPA filters.
  - (c) Location of piping, including details for piping support, expansion, etc.
  - (d) Location and details for building vents and drains.
  - (e) Location and installation details for all mechanical and electrical equipment, including identification of all equipment in conformance with the existing plant identification systems as provided in the design criteria.
  - (f) Details for demolition of existing equipment (when applicable).
  - (g) Location of electrical outlets, junction boxes, conduit stub-ups, communication conduits, alarms, etc.
  - (h) Complete wiring diagrams for controls and instrument connections.
  - (i) Complete P&IDs and one line electrical drawings. All ICPP piping and instrument symbology shall adhere to the appropriate drawing listed in Appendix D.
  - (j) Piping spool or isometric drawings. These may be supplied by either the AE or the CS as per the specification requirements.
  - (k) Loop diagrams. These may be supplied by either the AE or the CS as per the specification requirements and shall be drawn according to ISA S5.1.
  - (l) Clear identification of interface point/changes in construction materials (e.g., carbon steel to stainless steel).
- 3.3 In general, simplified drafting practices shall be used in the preparation of drawings. Artistic flourishes, complex projections, unnecessary frills, and excessive clutter shall be avoided. Drawing methods and standard symbols shall

conform to nationally recognized standards. Lettering on D, E, and F size drawings shall be 1/8 in. minimum to allow for legibility after microfilming.

### 3.4 Drawing Title

- (a) The primary title of drawings in a given project shall be derived from the official project title. The secondary title shall identify the specific drawing subject (e.g., foundations, piping details, electrical plan). The complete title should not exceed 60 characters.
- (b) Each drawing for a given project shall identify the operating area where the work is to be performed, e.g., CFA, ICPP, TAN.
- (c) Each drawing shall identify the building, structure or equipment that is described on the drawing, as applicable. The operating area and other identifying designations shall be the first line of the drawing title space.

### 3.5 Drawing Number

- (a) Each drawing shall be identified by a six-digit number. The AE drawing title block shall provide space for the drawing number (see Figure 0030-1). The AE will be given a block of drawing numbers from the DOE-ID OC and shall place the drawing number on the drawings prior to Approved for Construction.
- (b) Each drawing is given an alpha-numerical identification for use in the AE drawing number block. The AE drawing title block shall provide space for the AE drawing number (see Figure 0030-1). This number will be assigned by the AE at the start of the drawing and used for cross reference from one drawing to another (see Table 0030-1). The Scope of Work may require that all references between drawings be converted from AE drawing numbers to six-digit drawing numbers before the drawings are turned over to the OC.
- (c) Each drawing shall reference the drawing number of the drawing index sheet, with the exception of the drawing index sheet itself. The AE shall provide space for the drawing index reference number in the drawing title block (see Figure 0030-1).

- 3.6 Drawing Index Code In addition to the drawing number, each drawing shall display an Index Code Number adjacent to the drawing number which classifies the drawing for indexing in the EDMS. The AE Drawing Title Block shall provide space for the Index Code Number (see Figure 0030-1). The AE will be given the necessary instructions from the OC and shall place the index code numbers on the drawings prior to Title II approval.

- 3.7 Drawing Scales Both graphic and numerical scales shall be shown on all drawings. If only one scale is used on the drawing, the numerical scale shall be shown in the title block. If more than one scale is used, separate numerical scales shall be shown under each detail, plan, section, etc. that differs from the scale shown in the title block. Any details not to scale shall be so identified.

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- 3.8 Drawing Page Number In addition to drawing and index code numbers, each drawing sheet in a set of drawings for a given construction project shall be numbered consecutively in its sequential order. The page number shall be clear and legible, and be Arabic enclosed in a square. It shall be located in the margin at the extreme upper right corner of the sheet.
- 3.9 Marking Drawings for Security Classification All drawings containing sensitive, security risk, or classified information, as well as drawings of systems, structures, or components which serve a critical protective function for security purposes, shall be marked by the AE with the appropriate Security Control Classification as determined by an authorized classifying official and directed by the OC or DOE-ID. The classification shall be marked or stamped, in reproducible quality, directly on the original drawings prior to initial reproduction.
- 3.10 Disposition of Original Drawings Upon Conclusion of the AE's Services The original drawings shall be transmitted to the OC for electronic imaging, permanent storage, and future reference. If the drawings are determined to be sensitive or classified information, storage shall be in accordance with DOE classified storage requirements.
- 3.11 CAD-generated Drawings The AE must be able to transfer drawings to the OC as a "dwg" file.

#### 0030-4. COVER SHEET DRAWING

- 4.1 Unless otherwise directed, drawings for each construction project shall include a cover sheet drawing(s). The cover sheet drawing shall be the first sheet of the set and shall be properly titled and numbered in the same manner as the other drawings in the set. The following information shall be given on the cover sheet drawing or drawings:
- (a) An index giving a list of all the drawings in the set, including the cover sheet drawing itself. In cases where drawings for separate and distinct projects are combined into a single set for the purpose of bidding as a single construction package, the cover sheet drawing index shall designate the various projects by subcontract division number. The project and subcontract division numbers will be provided by the OC or DOE-ID.
  - (b) The INEEL site map (or other appropriate map) showing the various INEEL areas and pointing out the location of the construction area. An electronic copy of the INEEL site map or a reproducible decal will be furnished the AE upon request. Where further orientation is desirable or necessary, the AE should consider including an area plot plan (on this same cover sheet drawing) to show the specific construction site.

**0030-5. CHECKING OF DRAWINGS**

- 5.1 The AE shall thoroughly check all construction drawings for drafting errors, engineering adequacy, and constructability. The AE shall also make interdisciplinary checks for consistency and dimensional accuracy and shall make all necessary corrections prior to submitting the drawings for review and/or approval.

**0030-6. APPROVAL OF DRAWINGS**

- 6.1 All drawings shall be reviewed and approved by the responsible design engineer. The drawings shall also be approved by the OC or by DOE-ID. Such approval shall be signified by signature and date on the drawing or by other means consistent with the AE's document control procedures. Approval shall be obtained at the conclusion of Title II design work, or Title I work if Title II has not been contracted. The AE shall submit approved original drawings to the OC after all corrections and changes agreed upon during Title II (or Title I) review have been incorporated. The OC or DOE-ID will date the drawings and release for construction.

**0030-7. DRAWING REVISIONS**

- 7.1 General Information Changes incorporated after final approval of the design shall be classified as revisions and be properly recorded in the drawing revision block and be approved in accordance with the Project Quality Plan. Revisions shall be recorded using revision numbers for AFC drawings. Revision 0 should be used for the approved drawings or the first baseline. Revision block information shall include revision number, description of change, date of change, and space for approvals. When revision block information is blank it is understood that the drawings are Revision 0.
- 7.2 Marking Each new revision shall be circled and identified with a numbered arrow unless otherwise directed by the OC. Only the latest revision shall be circled and identified in this manner. As new revisions are issued, the circling and numbered arrow for the previous revision shall be removed.
- 7.3 Design Integrity The AE may be required by the OC to revise the drawings if changes are essential to retain functional integrity of the overall design. This may occur when an "or equal" product which differs substantially in the manner of installation or connection is submitted and approved for use.

**0030-8. COMPLETED TITLE II DRAWINGS**

- 8.1 Upon completion and final approval of Title II construction drawings the AE shall transmit the originals and electronic files to the OC or DOE-ID (unless otherwise provided in the Scope of Work). Where the AE is contractually responsible for further drawing services (Title II and/or Title III), electronic files shall be transmitted to the OC.

**0030-9. AS-BUILT CORRECTIONS AND STATUS LABELING**

- 9.1 As-built Corrections When included in the Scope of Work, the AE shall update the original drawings upon completion of construction to show all as-built conditions. As-built information shall be obtained from the OC. Upon conclusion of construction, the originals of key construction drawings shall be revised and marked in the revision block to indicate as-built condition as required by the OC in project documentation..
- 9.2 Status Labeling As design develops and project documents are prepared (e.g., CONCEPTUAL, TITLE I, FOR INFORMATION ONLY--NOT FOR CONSTRUCTION, TITLE II, APPROVED FOR CONSTRUCTION), the AE shall indicate on the drawings the current status before sending them to the OC or DOE-ID. See the sample drawing in Appendix C.

**Table 0300-1 AE Sheet Numbers**

T - Cover Sheet Drawings  
 C - Civil  
 U - Utilities  
 A - Architectural  
 S - Structural  
 P - Piping  
 FP - Fire Protection  
 M - Mechanical  
 H - Heating  
 V - Ventilating (Use HV where both heating and ventilation are covered)  
 E - Electrical  
 IN - Instrumentation  
 LSS - Life Safety System

Followed by a consecutive sheet number.

Examples: Civil: C-1, C-2, C-3, etc.  
 Architectural: A-1, A-2, A-3, etc.

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**TITLE: DRAWINGS**

**DATE: August 1998**

**SECTION: 0030**

2		1			
REVISIONS					
REV	DESCRIPTION	EFFECTIVE DATE:			

FOR DRAWING INDEX SEE DRAWING NO.		SUBCONTRACT NO.		<b>LOCKHEED MARTIN</b>	
0 <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> 1" 2" SCALE: 1" = 1" IN 1/10"		REQUESTER:		A	
0 <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> 1" 2" SCALE: 1" = 1" IN 1/16"		DESIGN:			
0 <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> 1" 2" SCALE: 1" = 1" IN 1/16"		DRAWING:			
0 <span style="display: inline-block; width: 100px; border-bottom: 1px solid black;"></span> 1" 2" SCALE: 1" = 1" IN 1/16"		PROJECT NO.			
DESIGN PHASE:		SPEC CODE		FOR REVIEW/APPROVAL SIGNATURES	
QUALITY LEVEL:		EFFECTIVE DATE:		SCALE:	
				D	
				AREA TYPE FC DBL	
				DWG--	
				SHEET	
				REV	

3                      2                      1

ADDCS NO.

**Figure 0030-1. AE Drawing Title Block.**

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**0040-1. CODES AND STANDARDS****1.1 Referenced Codes and Standards**

- c CSI, Construction Specification Institute
- c ISA 20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

**0040-2. FORMAT**

- 2.1 General** Final specifications shall be prepared using methods that will produce clear and legible reproductions. Specification sheet size shall be 8-1/2 x 11 in. The typed material shall be placed on the sheet such that it may be fully reproduced, including the page number, with an allowance for margins. Typing shall be single-spaced. On small jobs, where specifically instructed by DOE-ID or the OC, specifications may be shown on the drawing.
- 2.2 Methods** The AE shall use the available INEL Guide Specifications in the development of specifications, except when otherwise approved. The word "specification" throughout the remainder of this document shall refer to a specification produced by one of the following methods:
- (a) One specification for the entire construction project, including all disciplines and types of work to be performed. (A general contract document.)
  - (b) Multiple specifications, each describing all phases and types of work related to a specific discipline or category and describing the work to be performed. Each specification shall be considered as a separate and complete specification and shall be issued individually as completed. (Multiple prime contracts.)
  - (c) A set of specifications, each division of which is used to group individual sections that describe basic units of related work. Each division, when accompanied by the referenced sections and drawings, the general requirements, and the general and supplemental conditions of the contract, may be used to form the basis for a subcontract for installation of the work.
- 2.3** A decision as to which specification method is to be used, as well as which materials are to be government furnished, shall be made at the beginning of the project design phase, after consultations with DOE-ID and the OC. Where possible, specifications should be developed and grouped to support anticipated bid packages.
- 2.4 Makeup** The main body of the specifications shall be prefaced by a title page, approval page, and a general table of contents (see typical example of title page in Appendix E ).
- (a) The title page shall indicate the document (SPECIFICATIONS) and shall contain the project title, expenditure authorization number (if required), construction subcontract number, and the name "U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho."



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- (b) The approval page shall contain AE signatures indicating that the specifications have been prepared and checked by the AE. A sufficient number of spaces (as directed) for the approval signatures of the OC and the AE and the date of the final specification shall be provided.
  - (c) The table of contents shall be headed by the document title (SPECIFICATIONS), project title, and subcontract number, and shall list the major divisions of the specifications with corresponding page numbers.
  - (d) The first section in the specification shall give a summary of the work to be accomplished.
  - (e) The designation system for addressing articles, subarticles, paragraphs, subparagraphs, etc., shall be by section, page number and line number or by section, page number and paragraph number.
  - (f) Each page of the specification shall carry an identifying subcontract number, section number, and section page number. The page number shall be in the bottom margin of each page.
- 2.5 **Format** If specifications other than the INEL Guide Specifications are approved for use, the specification format shall conform to the recommendations set forth by the CSI. Other formats shall only be used when prior approval has been obtained from the OC or DOE-ID.

### 0040-3. CONTENT

- 3.1 **General Information** The AE shall prepare a complete set of specifications for each project design. Information contained in the specifications shall conform with and supplement the information contained on the drawings. The specifications, together with the drawings, shall contain information necessary to completely define the construction work to be performed by the Construction Subcontractor. A general work scope plus a work scope for each section shall be included.
- 3.2 The specifications shall describe in detail all materials, equipment, or other components used in construction. They shall describe any construction features which cannot be fully described graphically or by simple notation on the drawings. They shall contain requirements and instructions as to construction methods, performance, quality, testing, etc. Where appropriate, the AE shall state equipment identification numbers for major equipment in the specifications.
- 3.3 In general, all materials and equipment shall be standard, off-the-shelf items and shall be shown on the drawings and described in the specifications. Where shelf items are specified by one or more make and model numbers, the make and model number shall be followed by the words "or approved equal," and the AE shall verify that the item specified is currently available and is not obsolete. Where catalog or off-the-shelf items are selected but with minor modifications or the available extras, the specifications shall be particularly explicit as to the added features to ensure supplier perception. In these cases, the AE shall clearly

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define all features and make certain that there is no conflict between description and specified model number.

- 3.4 **Manufactured Equipment** In general, manufactured equipment items shall not be specified by make and model number alone, but shall be sufficiently described as to basic requirements (salient features) to allow submittal of an "or equal" item by the Construction Subcontractor. When so directed by the AE Scope of Work, specification forms for process measurement and control instruments, control valves, pumps, and similar equipment shall be prepared and included in the technical specifications. Forms shall be similar in format and requirement to ISA S-20.
- 3.5 **Sole Source** When specifying manufactured equipment items, the AE shall avoid preparing discriminating type specifications that limit or restrict procurement to a single manufacturer. Equipment specifications shall contain all necessary requirements to satisfy design performance, but shall not be overly restrictive to the extent of, or for the purpose of, excluding other manufacturers.
- 3.6 Where the AE elects to specify a "sole source" for a piece of equipment, he shall prepare a justification for the sole source procurement and submit it to the OC or DOE-ID for review and approval. See Appendix G for sole source justification requirements.
- 3.7 **Vendor Data** When specifying equipment (or materials) where it is necessary or advisable that certain specific data be furnished by vendors (such as performance data, factory test records, compliance certifications, samples, installation and maintenance manuals, etc.), the AE shall clearly define the specific data required in the Submittals section of the specification. Vendor data should be requested only when it will be used and evaluated. Effort should be made to minimize the number of copies required. Excessive or overly restrictive submittal requirements should be avoided.
- 3.8 The AE shall identify on the Vendor Data Schedule (see Appendix H) the number of copies required, whether the submittal is for mandatory approval or for information only, the approval authority (OC or AE), and time of submittal. The AE shall also indicate items requiring formal receiving inspection. Items requiring receiving inspection should include those that are complex or have critical interface parameters or those whose subsequent rejection would severely affect the construction schedule. In addition, receipt inspection should include those systems and components (fasteners, mechanical components and electrical components) that could be subject to counterfeit parts that (1) whose failure could adversely affect the environment or the safety and health of the public, and (2) those systems, components, and structures, whose failure could adversely affect the health and safety of workers, e.g., cranes, elevators, large vessels, etc.

Recent evidence makes it clear that the use of counterfeit parts in DOE programs and resultant personal injury and damage to equipment is possible. Appropriate engineering involvement is warranted in the product acceptance process for systems/components/materials that are subject to counterfeiting and whose failure could adversely affect the environment or the safety and health of the public or workers.

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- 3.10 Codes and Standards** In making reference to nationally recognized codes and standards other than those identified in the INEL Guide Specifications, the AE shall research the code requirements and reference only those sections which are applicable, or shall state the pertinent requirements directly in the specifications. Only the latest edition or issue shall be referenced. Where a given code or standard covers more than one grade, class, style, method etc., the applicable requirement shall be specifically stated.
- 3.11 Work Tasks** In specifying a particular work task or action, the AE shall avoid such phrases as "as directed by the OC ." Where a particular task or action is to be performed, but the details are in question or not readily available, the AE shall make every effort to resolve the details and state the required task clearly and conclusively so that the Construction Subcontractor knows in advance what is expected.
- 3.12 Testing and Inspection Requirements** Testing and inspection requirements shall be included in the specification as required to assure proper installation and function. Procurement specifications may require the vendor to supply documentation and test results on the components. Construction specifications may require testing of components/systems by the Construction Subcontractor.
- 3.13 INEL Guide Specifications** When using guide specifications, the AE shall take particular care not to include phrases which do not apply as requirements. All guide or standard specifications used shall be carefully screened for conformity and shall be edited to fit the design. A list of the available guide specifications is given in Appendix I. The guide specifications are available from the OC and DOE-ID in both electronic and hard copy form and will be supplied to the AE upon request.
- Guide Specification 01300 has been developed to address the special needs of the INEL with regard to specifying requirements for vendor data submittals. These needs must be addressed by other means if the AE desires not to use Guide Specification 01300.
- 3.14 Spare Parts** Where appropriate, specifications shall include a requirement for the manufacturer to provide a list of recommended spare parts. Special or unique parts or tooling shall be procured as part of the project.
- 3.15 Equipment Warranties** Specifications shall require standard warranties on all equipment unless otherwise directed by the PM.
- 3.16 Manufacturers' Field Service** Installations of unusual and/or intricate equipment requiring specialized or skilled mechanics shall be under the supervision of the manufacturer's representative. The manufacturer's representative shall be required to instruct operating and maintenance personnel in the use of the equipment.
- 3.17 Terminology** The following specific terms shall be normally used in the specifications:
- (a) **"Subcontractor"** This term shall be used when referring to the Construction Subcontractor.

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- (b) **"Contractor"** This term shall be used when referring to the OC. All interfaces by the Subcontractor on matters pertaining to notifications, submittals, direction, and administration shall be with the Contractor when the OC is the Contracting Officer.
- (c) **"Contractor's Representative"** This term shall be used in regard to the Title III Inspection or other Contractor Representatives. This term should be used to designate who performs and/or witnesses all inspections, NDEs, and tests.

#### 0040-4. MARKING SPECIFICATIONS FOR SECURITY CLASSIFICATION

- 4.1 All specifications containing sensitive, security risk, or classified information and specifications for systems, structures, or components that serve a critical protective function for security purposes shall be marked by the AE with the appropriate Security Control Classification as determined by an authorized classifying official and directed by the OC PM or DOE-ID. The classification shall be typed, stamped, or marked with a decal in reproducible quality on the bottom of each page directly on the original specification prior to initial reproduction.

#### 0040-5. CHECKING OF SPECIFICATIONS

- 5.1 The AE shall thoroughly check the specifications for engineering adequacy, conformity, and typographical errors before submitting them for review and/or approval. Interdisciplinary checks for conflicts, omissions, completeness, and engineering adequacy shall be performed by the responsible groups within the AE's organization.
- 5.2 When the specifications are submitted for final review and approval, the "Checked By" space on the specification approval page shall be signed by the AE's authorized checker, signifying that the final specifications have been checked and are satisfactory for review and/or approval action.

#### 0040-6. APPROVAL OF SPECIFICATIONS

- 6.1 All specifications shall be approved by the responsible design engineer and design supervisor. The specifications shall also be approved by the OC PM or DOE-ID. Such approval shall be signified by signature and date in the spaces provided on the approval page. Approval shall be obtained at the conclusion of Title II design work, or Title I work if Title II has not been contracted.

#### 0040-7. SPECIFICATION REVISIONS

- 7.1 **General Information** All revisions to specifications shall be made directly on the original typewritten sheets or on new typewritten sheets which replace the originals. After final approval of the design package, all revisions incorporated shall be properly recorded on the Approval Page and on all affected pages. Each new revision shall be numbered in consecutive order beginning with the number 1. The first completed package with approval pages shall be Revision 0.

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7.2 **Approval Page** The revision number and the date shall appear in the left column of the approval page. Each revision must be approved by the same organizations who approved the original specification.

7.3 **Page Revisions** Revised text shall be indicated by a bar in the right or left hand margin.

7.4 Specification changes made prior to final approval of the design shall not be recorded as revisions.

**0040-8. OR EQUALS**

8.1 Specifications and drawings shall be revised when necessary to reflect "or equal" items which are procured prior to the main construction, when such changes are essential to retain functional integrity of the overall design.

**0040-9. COMPLETED TITLE II SPECIFICATIONS**

9.1 Upon completion and final approval of the Title II (or Title I) specifications, the AE shall transmit good, reproducible and/or electronic copies of the specifications to the OC or DOE-ID as directed by the Scope of Work.

**0040-10. AS-BUILT CORRECTIONS**

10.1 **General Information** When included in the Scope of Work, the AE shall update the original specifications upon completion of construction to reflect all as-built conditions.

10.2 **Stamping** Upon conclusion of construction, the title page of the original specification shall be stamped or marked (in reproducible quality) with the words "As-Built" at the bottom center of the page.

10.3 Each page where as-built revisions are required shall be revised accordingly; however, no revision mark shall be placed on the page. All as-built revisions shall be approved by the OC or DOE-ID. The OC will sign and date the "As-Built" stamp on the title page.

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**DATE: August 1998**      **SECTION: 0050****0050-1. CODES AND STANDARDS**

X      None

**0050-2. PURPOSE AND SCOPE**

- 2.1 This procedure provides instructions for the preparation of revisions to the DOE-ID Architectural Engineering Standards (AES). It covers the process from the point that the need is identified by an individual/organization, to the point that the revision has been forwarded to Document Control (DC) for final processing.
- 2.2 The chairman of the AES committee is the designated custodian of the AES acting in conjunction with the AES committee and under the technical supervision and direction of DOE-ID. The custodian is listed in the "Forward" of the manual.
- 2.3 Revisions to the AES shall be considered at least annually by a committee, consisting of representatives from appropriate OC organizations and DOE-ID.
- 2.4 Revisions deemed significant by the AES committee may be incorporated upon approval.

**0050-3. PROCEDURE**

- 3.1 Preparing the Revision The revision is to be developed by the preparer using the following instructions and submitted to his/her AES committee representative upon completion.
  - (a) Understand the requirement being described by the revision. Investigate the requirement sufficiently to understand its effect on the design, construction, operation and maintenance activities. The interaction of involved organizations should also be considered.
  - (b) Identify all related requirements. Contact the AES committee representative for guidance in the identification of regulatory requirements imposed by the Department of Energy.
  - (c) Contact the AES committee representative to verify that the proposed revision is appropriate for inclusion in the AES. The following criteria will be used for acceptance:
    - 1. Only those revisions which have an application for large or widely distributed elements of the INEEL will be considered.
    - 2. If the revision is necessary in order to assure uniform process control for overall design efficiency or regulatory compliance.
    - 3. A revision will be considered whenever the need for standardization is identified, and there is a clear advantage for standardization.
    - 4. A revision will be considered if it does not violate or conflict with any governing laws, standards, regulations or directives. Revisions that

incorporate requirements exceeding industry standards require justification. Revisions should be cost effective. Revisions that will save cost are encouraged if they conform to the first sentence. The preparer is responsible to do an evaluation prior to submittal to the steering committee.

(d) Prepare the revision using the following guidelines:

1. The revision should be written as it is proposed to appear in the Standards. Numbering changes, text changes, and any changes necessary in other Sections should be included. The basis or justification for the change should also be included with each proposed revision.
2. Integrate the proposed revision in such a manner that flow of the context is suitably consistent with existing criteria.
3. Define all acronyms, abbreviations, and special discipline related terminology.
4. Organize the information to provide the greatest understanding from the user's perspective.
5. Use a command statement or the words "shall" or "must" to denote required compliance. Use the word "should" or "may" to denote recommendations or nonmandatory guidance.
6. Ensure that the instructions contain statements regarding cautions, prerequisites, and supporting documentation where appropriate.
7. List all documents that establish requirements implemented, and all documents referenced in the body of the revision.
8. Ensure that no conflicts or violations of governing laws, standards, regulations or directives exist. Justify revisions that impose requirements that exceed industry standards.

**3.2 Reviewing Proposed Revisions** The AES committee shall review proposed revisions. The committee shall consult with other INEEL committees and experts as necessary to ensure that changes comply with laws and regulations, that requirements are consistent with national standards or guidelines, and that justification for changes or additions is adequate. Changes to criteria regarding natural phenomena shall be approved by the INEEL Natural Phenomena committee prior to incorporation in the AE

**3.3** Justification for changes and final approval of revisions shall be documented in AES committee meeting minutes. Approved revisions shall be added to the Requirements Justification database.

**3.4 Issuing the Revision**

- (a) The chairman of the AES committee shall submit the approved revision to the OC document control organization for final processing and issue. The

OC document revision issue process shall be followed.

- (b) Revisions shall be clearly distinguishable from unrevised text. The approved method is revision bars in the margin. Whenever a section is revised the section will be reissued in its entirety along with a revised Table of Contents for the standard. The revised section will be given a new date consistent with the revision date. This date will appear in the ISSUE DATE column of the Table of Contents.
- (c) The approved revision will be issued by the OC document control organization.



**0100-1. CODES AND STANDARDS**

- 1.1 The general building code for the INEEL is the Uniform Building Code (UBC). It shall apply unless otherwise indicated herein or in the specific project Design Criteria. Other national codes are applicable to specific sections. For example, the National Electrical Code is applicable to the electrical sections of this document.
- 1.2 Design for facilities which are under the jurisdiction of city or county government shall comply with the codes adopted by those institutions. For example, leased buildings in the City of Idaho Falls shall comply with the UBC edition adopted by the city at the time design begins.
- 1.3 ASTM Standards should be used for specifying materials. Other applicable standards such as AASHTO may be used when appropriate.
- 1.4 The following references contain requirements which are applicable to designs at the INEEL:
  - 29 CFR 1910, Occupational Safety and Health Standards
  - 29 CFR 1926, Occupational Safety and Health Standards for the Construction Industry (for construction activities, such as shoring)
- 1.5 New buildings and facilities shall comply with ANSI A117.1, Specifications for Making Buildings and Facilities Accessible to, and Useable by, Physically Handicapped People, unless specifically exempted by the Design Criteria. This requirement shall also apply to major modifications to buildings and facilities.
- 1.6 ID Notice N 430.1 requires that "for specific facilities under the purview of the Defense Nuclear Facilities Safety Board" DOE 6430.1A shall "remain effective until 10 CFR 830.340 and DOE O 420.1, Facility Safety, are finalized and incorporated into the contract, respectively." LMITCO MCP-2446 Appendix A is a list of LMITCO controlled nuclear facilities at the INEEL. DOE 6430.1A design requirements may be applicable to modifications of the facilities on this list.

**0100-2. GENERAL**

- 2.1 These standards provide mandatory, minimally acceptable requirements for facility design. The Uniform Building Code and other national consensus codes and standards as applicable shall govern on issues not covered in this standard. References to codes and standards shall be to the latest edition unless otherwise indicated. The requirements given in this standard are generally for nonreactor construction. Where it was considered appropriate, some general requirements applicable to nuclear facilities are included. Such requirements, when they appear, are so identified. The specific requirements for nuclear, special, and hazardous facilities will be addressed in the project design criteria.

- 2.2 This manual is provided as a guide to augment and clarify application of the national codes and standards at the INEEL. No attempt has been made to list all applicable codes and standards; therefore, where a particular design aspect is not covered by any of the codes or standards listed, nor by the sections in this manual, the AE shall be guided by other nationally recognized and accepted codes or standards that do apply.

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**0110-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- c AES 0100-1, Codes and Standards
- c NFPA-101, Life Safety Code
- c NFPA Codes applicable to special occupancies or materials

**1.2 Referenced Codes and Standards**

- c DOE M 440.1-1, DOE Explosive Safety Manual
- c ICBO, Uniform Fire Code (UFC)
- c NFPA 101A, Alternative Approaches to Life Safety
- c FM Engineering Association Approval Guide
- c FM-1-57, Factory Mutual Loss Prevention Data, Rigid Plastic Building Materials
- c UL Fire Resistance Directory

**0110-2. GENERAL**

- 2.1 In general, architectural design will be plain and simple without aesthetic embellishment.

**2.2 Rest Room Facilities**

- (a) Rest room facilities shall be provided in all buildings and structures that house persons on a regular day-to-day basis. Separate facilities shall be provided for each sex, except as provided by the UBC, and shall be located within 200 ft of all locations at which workers are regularly employed (if practicable). See Section 1541, Plumbing Systems.
- (b) Facilities for the handicapped shall be provided as identified in the project design criteria.

- 2.3 **Safety Color Code** Designs shall include provisions for safety color code painting, where applicable. At ICPP, valves, jets, etc., needed for criticality safety are painted orange.

- 2.4 **Electrical and Telephone Rooms** The architect shall coordinate the size and locations of the switching equipment, electrical, and telephone rooms with the electrical engineer.

- 2.5 **Telephone Rooms** New installations shall be provided with telephone/data equipment rooms which meet the following requirements while renovation of existing rooms should meet these requirements as much as practical:

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- Ⓒ Rooms shall be approximately 80 square feet for buildings with an occupancy of up to approximately 50 people.
- Ⓒ Rooms shall be approximately 120 square feet for buildings with an occupancy of up to approximately 250 people.
- Ⓒ Rooms shall be approximately 600 square feet for buildings that accommodate a local switcher.

### 0110-3 FIRE PROTECTION

3.1 **General** See Section 0185 for general fire protection requirements and standards.

3.2 **Life Safety** Designs will include provisions for safe access and rapid movement of emergency equipment in accordance with applicable standards. In the case of facilities containing explosives, exits shall reflect the criteria contained in the DOE *Explosive Safety Manual*, DOE M 440.1-1, and shall meet NFPA egress requirements for occupancies containing high hazard materials, as a minimum.

**Note:** A high hazard occupancy (Group H) per UBC includes any area which contains greater than one pound of explosives.

3.3 Life Safety provisions (access, emergency egress, emergency lighting, fire and evacuation alarms) shall be provided for all facilities in accordance with the Life Safety Code NFPA 101 as a minimum. The provisions of the UBC in regard to life safety shall also be considered. When approved by the DOE-ID AHJ, the methods outlined in NFPA 101A may be used to obtain an equivalent level of life safety where strict compliance is not possible for existing facilities. Where compliance with some Life Safety Code provisions may conflict with public safety, as in some containment structures, the noncompliance shall be documented in a fire hazard analysis (FHA); and additional protective systems, administrative controls, and personnel limits should be provided.

3.4 Facilities shall also comply with federal fire protection-related life safety and emergency planning requirements contained in 29 CFR 1910, Occupational Safety and Health Standards. Except as required by other sections of these criteria, NFPA 101 shall apply where 29 CFR 1910 does not apply or where NFPA 101 exceeds the requirements in the CFR.

3.5 Design requirements for life safety issues will be provided. All facilities shall comply with the mandatory criteria identified in Section 0185 of this standard.

3.6 **Emergency Planning and Emergency Access** Fire Department access shall not be less than that required by the Uniform Fire Code. Coordination with emergency response organizations should be done in advance as part of design activities for new or revised buildings, operations, or processes.

3.7 **Occupancy Classification** The occupancy classification for building design and fire resistance ratings shall be established using UBC criteria. NFPA 101, "Life Safety Code,"

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shall be used for determining the occupancy classification for means of egress arrangement requirements.

- 3.8 Building Fire Construction Ratings** Definitions, fire resistance ratings, and types of construction shall be based on the UBC.
- 3.9 Building Materials** Materials for building construction shall be noncombustible and meet the requirements for UBC Type I or Type II construction or better. Specific guidance is provided below:
- (a) Wood or metal stud walls, covered on both sides with 5/8-inch gypsum board and properly fire stopped, are permitted for interior partitions, provided the installation meets UBC requirements.
  - (b) Acoustical ceiling board, sound deadening board, exposed roof or wall insulation, and similar building materials shall be noncombustible and shall have UL "flame spread" of 25 or less and "smoke developed" ratings of not more than 450.
  - (c) In special cases, where it is deemed mandatory to use substantial quantities of wood (e.g., due to the nature of an experiment which prohibits certain metals in close proximity) such use must be approved by the OC Cognizant FPE. In all cases, wood shall be UL listed pressure impregnated fire retardant lumber.
  - (d) Telephone dial rooms constitute a special case consideration. Pressure impregnated fire retardant plywood sheet may be used if it does not exceed 32 square feet (i.e., a 4' x 8' sheet). For areas greater than 32 square feet, a limited combustible sheet with a flame spread rating of 25 or less shall be used with the approval of the OC Facility FPE.
  - (e) Any materials with unusual fire characteristics, such as urethane foams, and any materials that develop significant quantities of toxic or other harmful products of combustion shall not be used as interior finishes or other interior applications without the approval of the OC Cognizant FPE. The use of foamed plastics in construction shall be prohibited unless it fully complies with FM-1-57, or the UBC.  
The use of foamed plastics is permitted below ground, when enclosed by masonry, or above roof decks when part of a UL listed and/or FM approved assembly or as part of UL listed and/or FM approved "sandwich" wall construction assembly which has passed the FM "corner test" without sprinkler protection and is installed in accordance with the UBC. This material shall not be used in nuclear facilities or in areas susceptible to smoke damage. Foam core doors are acceptable if no core material is exposed.
  - (f) For temporary enclosures within facilities only noncombustible or limited combustible materials shall be used. An example of limited combustibility would be a low hazard plastic over a metal or fire retardant wood frame which has been treated with a fire retardant material.

- 3.10 Built-Up Roof Systems** See Division 7 for fire protection requirements for roofing.

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**3.11 Fire Barrier and Occupancy Separation Requirements** Fire rated barriers (walls, floors, ceilings, radiant heat shields, fire wrap) shall be utilized as required by the UBC, NFPA 101, the UFC or as deemed necessary by the DOE-ID AHJ.

- (a) **Loss Control Separation** Normally, major building division fire barriers, rooms with cut-offs for high valued equipment such as control rooms and vertical fire separations should be rated at a minimum of 2 hours. Redundant essential equipment which could be lost or severely damaged in a single fire shall be protected by appropriate measures. The requirements of the UBC shall be used as a minimum.
- (b) **Occupancy Separation** Adjacent occupancies of noncompatible groups shall be separated as required by UBC and applicable NFPA codes and standards.
- (c) **Fire Barrier Assembly Ratings** Fire barriers, assemblies and penetrations of the fire barriers (piping or conduit penetration seals, ducts, fire dampers, and doors) shall be rated for their fire resistance by UL, FM, or similar nationally accredited testing laboratories. Untested, unrated or unapproved assemblies shall be approved by the OC Cognizant FPE.
- (d) **Pipe and Conduit Penetrations** Penetrations through fire rated barriers using sleeves shall comply with the following requirements. Sleeves will be of sufficient length to pass entirely through walls, partitions, or slabs. Pipe sleeves in floor slabs shall extend 2 inches above the finished floor, with pipe/sleeve clearance installed in accordance with NFPA 13. Space between the pipe and sleeve shall be sealed. Sleeves will be sloped to drain towards process areas. Penetrations through fire barriers require sealing equal to the rating of the fire barrier.

**3.12 Liquid Run-off Control** In general, containment shall comply with UBC or NFPA code requirements, as applicable. This includes containment of water resulting from fire fighting operations from a credible fire if required by the codes. During design, the amount of fire water that must be controlled within the containment system shall be determined by the OC Facility FPE.

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- C AES 0100-1, Codes and Standards
- C DOE Order 420.1, Facility Safety
- C DOE-STD-1020, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities
- C DOE-STD-1021, Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components

**1.2 Referenced Codes and Standards**

- C ASCE 4 Seismic Analysis of Safety-Related Nuclear Structures
- C ASCE 7, Minimum Design Loads for Buildings and Other Structures
- C Factory Mutual Data Sheet 1-54
- C USNRC Regulatory Guide 1.60

**1.3 Other References**

- C DOE-ID--12118, Climatology of the INEL, 2nd Ed., December 1, 1989

**0111-2. GENERAL**

- 2.1 Structural design shall conform to applicable sections of DOE-STD-1020, the criteria contained in this document, and the specific project design criteria, and shall comply with current editions of pertinent nationally recognized codes and standards as referenced herein.
- 2.2 Natural phenomena requirements (for example: seismic, wind tornado, flood) shall be in accordance with DOE-STD-1020 with additional guidelines as indicated in the following subparagraphs. The natural phenomena hazard classification for structures, systems, and components shall be defined in the project design criteria.

**0111-3. TEST BORINGS**

- 3.1 Test borings or other subsurface investigations shall be considered in designing below grade structures or foundations for structures imposing heavy or unusual soil loading conditions. Underground rock formations at the INEL vary widely, and at many locations the rock is at or near the surface. Therefore, it is essential that subsurface conditions be known in designing underground structures. Rock depths and soil conditions are known in some areas. This information will be furnished the AE where available. Where subsurface investigation

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is not warranted, the allowable soil pressure for design purposes shall be in accordance with the UBC.

**0111-4. FOUNDATIONS**

- 4.1 Footings shall be designed such that they are adequate to support the structure and keep differential settlements within acceptable limits. Design frost depth shall be obtained from data such as that contained in DOE/ID-12118. Unless such data is used, frost depth shall be considered to be 5 ft. Footing design shall consider soil conditions, load, settlement, and any other pertinent factors.

**0111-5. LOADS**

- 5.1 Unless otherwise specified herein loads shall comply with ASCE 7 and DOE-STD-1020 as applicable.
- 5.2 Unusual loadings not covered by the codes will be identified in the project design criteria.
- 5.3 **Snow Load** A ground snow load of at least 35 lb/ft<sup>2</sup> shall be used in ASCE 7 calculations. A minimum roof snow load of 30 lb/ft<sup>2</sup> shall be used in all INEL designs. Suitable calculational techniques and additional information are given in Factory Mutual Data Sheet 1-54 and ASCE 7.
- 5.4 **Tornado Loads** Unless otherwise directed in specific project Design Criteria, buildings and structures shall not be designed for tornado loads. When tornado loading is required, it shall be done in accordance with DOE-STD-1020.
- 5.5 **Wind Loads** All structures, systems, components, or portions thereof subject to wind loading shall be designed in accordance with DOE-STD-1020.
- 5.6 **Flood** Protection against flooding shall be considered in the design when required by the project design criteria. The data for the design basis flood will also be provided. Flood design shall be in accordance with DOE-STD-1020. The INEL site specific standard for a 25 year, 6 hour storm is 1.4 in. total. This storm shall be used as a minimum for the design of localized storm runoff and drainage.
- 5.7 **Seismic Loads** To clarify the application of these guidelines with regard to modifications to existing facilities see DOE Order 420.1.
- 5.8 Seismic loads shall be considered in the design of all permanent buildings, structures, cranes, towers, etc. An earthquake shall be assumed capable of occurring at any time. For design purposes, the simultaneous occurrence of an earthquake with any other limiting site-related event, such as high winds, fire, or flood need not be considered except where the joint occurrence is causally related. Such instances will be identified in specific project design criteria.
- 5.9 Additional requirements, for cranes involved in "critical" lifts, will be identified in specific project design criteria.



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**5.10 Performance Categories 1 and 2 (see DOE-STD-1021).**

The UBC shall govern and shall be used as the basis for design.

**5.11 Performance Categories 3 and 4 .**

- (a) For the INEL, the seismic input control motion is specified for each facility location by appropriately scaling the USNRC R.G. 1.60 horizontal spectra. The input motion is assumed to occur in the free-field at the top of a real or hypothetical rock outcrop near the location of the facility. To obtain the appropriate horizontal input spectra for Performance Category (P.C.) 3 and 4 facilities at each of the INEL areas, the following factors shall be used to scale the R.G. 1.60 spectra:

Area	P.C. 3*	P.C. 4*
ICPP	0.18 g	0.24 g
CTF/ TAN	0.26 g	0.35 g
PBF	0.17 g	0.22 g
RWMC	0.16 g	0.21 g
TRA	0.18 g	0.24 g

\*The tabulated values are from deterministic studies.  
 Probablistic values are being developed.

- (b) The vertical input spectra for each facility shall be taken as 2/3 of the respective horizontal spectra defined above.

**5.12 The stated peak acceleration values are ZPA values to be used in conjunction with the horizontal response spectra given in the USNRC R.G. 1.60. The resulting seismic spectra curve is to be assumed to occur at a real or hypothetical rock outcrop. If a detailed soil amplification analysis is done, derived factors shall be documented in the project design file. In lieu of a detailed soil amplification analysis, the soil surface spectra may be taken to equal the rock outcrop spectra (as though taken at bedrock) multiplied by the following appropriate minimum factor:**

- (a) 1.2 for soil overburden up to 20 ft.  
 (b) 1.5 for soil overburden between 20 ft and 50 ft.

**5.13 The application of the design spectra is governed by DOE-STD-1020.**

**5.14 It is felt that the peak ground acceleration values presented are conservative and should be used for GPP or small Line Item sized projects. Where the cost of studies, analysis, and**

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characterization is economically justified for larger projects, site specific values may be used per DOE-STD-1020.

- 5.15 The methodology presented in DOE-STD-1020 is based upon a probabilistic definition of the facility performance goals as expressed in annual probability of exceedance. A deterministic approach is then used to evaluate structural adequacy.
- 5.16 In the future, it is planned to develop INEL site specific probabilistic hazard curves for each facility area. Until these curves are developed, in performing the seismic analysis for P.C. 3 and 4 facilities, the analysis methodology presented in DOE-STD-1020 should be followed but the deterministic values provided in paragraph 5.11 should be substituted for the probabilistic values shown in DOE-STD-1020.
- 5.17 Equivalent static analysis methods as defined in ASCE 4 may be used for simple structures. An example of a simple structure is a one or two story shear wall building.

**0111-6. ISOLATION PADS**

- 6.1 Heavy items of equipment, such as boilers, diesel engine generators, heavy machine tools, large pumps, large compressors, etc., shall be anchored on separate, reinforced foundations which are isolated from the floor system.

Project Name*	Interim Award Only (Previously Registered)	Registration and Award	Project Completed	Hours Worked	Period	Number of Employees	Award	Date Submitted to NSC	Comments	Personnel to Receive Plaques	Plaque Order Date
1 Program Management Contract - Rocky Mountain Arsenal	X		no	336428	1/1/86 - 12/31/86	170	Award of Commendation				
2 USACE - Southwest TERC	X		no	7777	1/1/87 - 12/31/88	777	7777				
3 New England TERC - Norwood PCB Superfund Site		X	no	80000	2/8/85 - 12/31/86	15	President's Citation				
4											
5											
6											
7											
8											
9											
10											
11											
* All project names include "Foster Wheeler Environmental Corporation"											

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**DATE: September 1997****SECTION: 0112****0112-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C 10 CFR 435, Energy Conservation Performance Standards for New Buildings
- C DOE O 430.2 In House Energy Management
- C ASHRAE Standard 100 shall apply to existing construction.

**1.2 Referenced Codes and Standards**

- C NBS Handbook 135, Life Cycle Cost Manual for Federal Energy Management Programs
- C ASHRAE publication, Passive Solar Heating Analysis, J. Douglas Balcomb, et al., 1984
- C NAVFAC DM-4.9, Naval Facilities Engineering Command Design Manual

**1.3 Other References**

- C ID-12118, Climatology of the INEL, Second Edition, Dec. 1, 1989
- C RE-A-83-050, A 33 Year Statistical Study of the Air Temperature at the INEL
- C DOE AD-0006/1, DOE Facilities Solar Design Handbook
- C CR 82.030, Standardized EMCS Energy Saving Calculations

**0112-2. GENERAL**

- 2.1 The requirements of 10 CFR 435, shall be met for all new buildings and significant building alterations. All design projects for ID energy-using facilities (including significant renovations to buildings, site utility systems, and central utility plants) shall include cost evaluations based on life cycle cost rather than initial cost so that the most cost effective designs for conserving energy can be considered.
- 2.2 The prevention of hazardous conditions through proper air flow control takes precedence over energy conservation considerations.
- 2.3 Additional insulation should be used where it is life cycle cost effective. Triple glazing is usually cost effective on the north side of buildings, while double glazing is adequate on the remaining sides.

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- 2.4 Designs shall minimize the use of petroleum based fuels by using less polluting and non-petroleum based energy sources when cost effective.
- 2.5 Evaluations of energy conservation systems and supply alternatives are required from planning or conceptual design into the detailed (Title II) design phase. These evaluations include new or updated life cycle cost analyses, and often result in different systems being selected than originally conceptualized. Therefore, careful consideration is required during the planning or conceptual design to ensure that the cost estimates provide adequate funding to cover any changes in selected systems that are likely to occur during the design process.
- 2.6 Electric resistance space heating should be used only in specialized, cost effective applications.
- 2.7 The latest edition of NBS Handbook 135, Life Cycle Cost Manual for Federal Energy Management Programs, which contains current economic factors and energy escalation rates, shall be used for life cycle cost analyses.
- 2.8 The seasonal Energy Efficiency Ratio to be used in specifying air conditioning equipment below 65,000 Btu/h in capacity should not be less than 8.2 Btu/watt-hour.
- 2.9 The application of other renewable energy sources in facility projects (photovoltaics, wind, geothermal, or other renewable energy sources) should be evaluated where it is determined that they may be life cycle cost effective.

**0112-3. SOLAR**

- 3.1 Solar data for the INEL is given in the DOE Facilities Solar Design Handbook, DOE AD-0006/1. Monthly DD values for CFA and TAN are shown in Table 1520-1. Additional information can be obtained from ID-12118, Climatology of the INEL, and RE-A-83-050, A 33 Year Statistical Study of the Air Temperature at the INEL.
- 3.2 Active solar techniques are not presently cost effective for the geographical and economic climate at the INEL and need not be considered in design projects for DOE at this time.
- 3.3 Passive solar techniques shall be considered for all building projects and used wherever they are determined to be technically feasible and economically justifiable. An accepted methodology for analyzing the performance of passive solar systems can be found in Passive Solar Heating Analysis, an ASHRAE published design manual (Los Alamos National Laboratory, 1984). Some examples of techniques to be considered include:
  - (a) Passive solar space heating.
  - (b) Passive solar water preheating (low cost/maintenance batch heaters).

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- (c) Daylighting (use of daylight to reduce electric lighting loads).
- (d) Passive cooling (through load avoidance, night ventilation, etc.).
- (e) Solar make-up air preheating.

**0112-4. ENERGY CONSERVATION ANALYSIS AND REPORTS**

- 4.1** An energy conservation report shall be developed for each new building and building addition larger than 10,000 gross sq. ft. The initial report shall be included as part of the Title I design and should be updated at the Title II design phase, if significant changes occur. The Energy Conservation Report shall:
- (a) Identify the methods used for simulating building energy consumption and the methods of life cycle cost analysis used to consider alternative building systems and the alternative energy sources.
  - (b) Describe the base-line building including envelope parameters, H&V systems, lighting systems, water heating systems, process energy consumption, and controls.
  - (c) Estimate total energy consumption of the base-line building. Total energy consumption in a building includes both building energy consumption and process energy consumption. Building energy consumption refers to that energy used primarily for heating, ventilation, cooling, domestic hot water, and lighting. Process energy consumption is energy used in a process, production, or research program.
  - (d) Describe any major energy conservation modifications to the base-line building.
  - (e) Estimate total energy consumption of the modified building.
  - (f) Discuss the types of permanent metering for energy inputs to the building.
- 4.2** Upon completion of the Title I design stage, four copies of the Energy Conservation Report shall be submitted to the OC. If there are significant applicable design changes during the final design stage the Energy Conservation Report shall be revised and submitted.
- 4.3** A suitable type of manual or computer analysis (dynamic or static) shall be employed to develop energy efficient building design concepts, evaluate energy conservation alternatives, and estimate the total energy consumption on an annual basis for the Energy Conservation Report. The analysis is required at the end of the Title I design phase and should be updated during the Title II stage. For all other buildings or building projects where floor space is less than 10,000 square feet a manual analysis method may be used to evaluate energy conservation alternatives and estimate design energy consumption.
- 4.4** The purpose of the conservation analysis is to evaluate energy and design alternatives and develop capital cost estimates of the alternatives which, though they are more expensive on a capital cost basis, may be cost effective on a life-cycle cost basis, so that capital cost estimates of such alternatives can be used in the updated project cost estimates. In addition, the building energy analysis shall:

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- (a) Determine the annual heating and cooling loads for alternative architectural, mechanical, and electrical system combinations based on site weather data.
- (b) Simulate the operation of various mechanical, electrical, and environmental systems using this thermal load analysis to determine monthly and annual energy consumption.
- (c) Economically evaluate, as appropriate, the annual owning, operating, and maintenance expenses for the projected building life for each of the systems or system combinations (life cycle costing technique). Conversion values listed in Table 0112-2 should be used for comparisons of energy consumption. Fuel unit cost data may be obtained from the OC Energy Management organization.

**0112-5. ENERGY METERING**

- 5.1 Metering shall meet the requirements of 10 CFR 435.
- 5.2 Energy supplied from a renewable energy source or from waste heat recovery need not be metered.
- 5.3 Energy metering requirements need to be considered at Conceptual Design to ensure that metering is included project baseline cost.
- 5.4 In the selection of metering devices, proper consideration shall be given to compatibility for use with an existing or projected EMCS.

**0112-6. ENERGY MONITORING AND CONTROL SYSTEM (EMCS)**

- 6.1 Energy management systems, which are characterized by their ability to control energy consuming systems or equipment for optimum efficiency, should be provided wherever they are determined to be technically feasible and life cycle cost effective.
- 6.2 Criteria and methodology for the design of an EMCS may be obtained from NAVFAC DM-4.9, "Energy Monitoring and Control Systems."
- 6.3 A methodology for estimating the energy conservation performance of an EMCS may be obtained from the Naval Civil Engineering Laboratory document, CR 82.030, Standardized EMCS Energy Saving Calculations.
- 6.4 Care should be taken to ensure that energy management systems do not negatively impact the function or operation of related systems, such as freezing of sprinkler pipe in concealed spaces.

**0112-7. INSULATION**

In designing heated buildings, the heat transmission coefficient ("U" value) shall not exceed .064 (R=15.6) for walls nor .045 (R=22.2) for roofs or roof/ceiling combinations unless economically justified. The use of any asbestos-containing product is prohibited.

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**TABLE 0112-1. Monthly Heating Degree-Day Values for INEL**

Month	CFA	TAN
January	1511	1600
February	1257	1291
March	1076	1107
April	710	657
May	429	388
June	161	192
July	3	16
August	21	40
September	280	282
October	657	648
November	1050	1107
December	1411	1432
Total	8566	8760

**TABLE 0112-2. Btu Conversion Factors**

Electricity	3,413 Btu/kilowatt hour
Fuel Oil (distillate)	138,700 Btu/gal
Residual Fuel	149,690 Btu/gal
Natural Gas	1,030 Btu/cubic feet
(LPG), including propane and butane	95,500 Btu/gal
Coal	24,580,000 Btu/short ton
Steam	1,000 Btu/pound

For energy sources not listed, use conversion factors from a standard engineering reference manual or other reliable reference.



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**0140-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- c AES 0100-1, Codes and Standards.
- c 10 CFR 830.120, Quality Assurance Requirements (applicable to nuclear facilities)
- c DOE-ID Order 5700.6C, Quality Assurance

**0140-2. QUALITY REQUIREMENTS**

- 2.1 The AE is responsible for the quality assurance of the work he performs. The AE is additionally responsible to identify quality requirements for the project to ensure that interfacing contractors meet the design requirements.
- 2.2 A Quality Program Plan (QPP) may be developed during the conceptual design phase of the project with input from the AE when requested. This plan shall specify quality programmatic requirements applicable to each project including requirements for a design Quality Assurance Plan (QAP). A graded approach shall be used in development of the QPP.
- 2.3 The AE may be required to develop a QAP to control design activities. See Section 0020 2.3.

**0140-3. QUALITY REQUIREMENTS FOR SPECIFICATIONS AND DRAWINGS**

- 3.1 The AE shall include in the specifications and drawings the quality requirements that must be met by the Construction Subcontractor, and the Vendor and shall identify the party responsible to perform the requirements. The AE shall review applicable sections of any project QPP in the preparation of these requirements. The bid package shall include applicable QA programmatic requirements for pass down to the construction subcontractors. Typical but not minimum quality requirements to be addressed in specifications and drawings are:
  - (a) **Hold/Witness or Inspection Points** These are areas where inspections must be performed prior to work continuance. Without such inspections, the product acceptability could not be assured.
  - (b) **Vendor Data Submittals** The AE should specify submittals that are necessary to provide information for operation or maintenance and to ensure that the required quality of the item or component can be verified.
  - (c) **Special Processes** The AE should establish special process requirements based on applicable codes or standards and acceptance/rejection criteria. These special processes control or verify quality and include welding, brazing, cleaning, heat treatment, nondestructive examination, etc.

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- (d) **Quality Records** The AE shall identify any QA records to be generated during the design phase.
- (e) **Handling, Shipping, and Storage** Handling, packaging, preservation, storage, and shipping requirements shall be identified.
- (f) **Testing** The AE shall specify test procedures or standards, test documentation requirements, and acceptance criteria.
- (g) **Traceability** Crucial construction materials and components requiring unique traceability to point of installation shall be identified.

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**0180-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C DOE 1360.B, Unclassified Computer Security Program
- C DOE 5636.C, Protection and Control of Safeguards and Security Interests
- C DOE 5639.6A, Classified Automated Information System Security Program
- C DOE G 5632.1C-1, The Guide for Implementation of Classified Matter Protection and Control
- C DOE M 5632.1C-1, Manual for Protection and Control of Safeguards and Security Interests

**1.2 Referenced Codes and Standards**

- C NFPA 780, Lightning Protection Code

**0180-2. GENERAL**

- 2.1 **Objectives** Security requirements or needs are based upon a graded concept of possible consequences (such as sabotage, theft, interruption of production, and damage to public relations efforts). A systems approach is used to determine specific requirements needed to meet the security objectives. These requirements may include:
  - (a) Restriction of access to an area or facility.
  - (b) Detection of a security breach.
  - (c) Response capabilities.
  - (d) Delay features.
- 2.2 **Project Security Requirements** The design criteria for each project will contain the specific safeguards and security requirements that must be met for that project. They may be very specific and identify the systems to be used, or they may only give general guidelines and leave the design to the AE.
- 2.3 **Design Qualifications** For complicated and/or major security projects, it is essential that the AE provide qualified personnel with adequate knowledge and experience in the systems involved. Specific requirements will be identified in the project Scope of Work.

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- 2.4 Classification of Project** Where construction of facilities with a security interest exists, classification of construction, design, and criteria may be necessary, depending on the extent of the information revealed (i.e., vulnerabilities and security features). Security clearances for design personnel may be required. All personnel shall be briefed on what is classified and what is not, and efforts should be made to allow as much unclassified design and construction as possible. Physical protection of security interest must comply with the requirements of DOE Order 5632.1C and be classified according to applicable DOE Classification Guidance. Also, unclassified construction, design, and criteria information could be subject to unclassified controlled nuclear information guidelines.
- 2.5 Safety and Security** Security requirements that conflict with safety requirements may occur; these conflicts must be resolved as part of the design process. When conflicts such as these arise, the AE should bring them to the attention of the OC, who will obtain a resolution. Generally, design of security systems must accommodate life safety considerations while still providing acceptable security protection levels.
- 2.6 Reliability** Design shall give appropriate consideration to security system reliability, since in most cases the systems will be operating on a continuous basis and under extreme environmental conditions.
- 2.7 Equipment Selection**
- (a) **INEL System Compatibility** Security systems are generally designed to be compatible with systems at all INEL sites. Any new system shall be compatible with existing systems, and use of a new system must be approved by the OC. The design should consider the possibility of future expansion as directed by the design criteria.
  - (b) **INEL Standardized Components** Much of the security equipment used at various INEL facilities is standardized. Designers shall obtain the standardized component lists from the OC, and the design shall be compatible with these components.

**0180-3. FENCING**

- 3.1 Permanent Plant Perimeter Security Fencing** Specific fencing requirements will be given in the design criteria. Present security fencing design consists of pipe-supported chain-link fabric as shown on the standard drawings listed in Appendix D. The animal barrier fence is generally designed the same as the security fence, but without the barbed wire.
- 3.2 Temporary Construction Security Fence** The use of a temporary construction security fence will be permitted inside the secured area. This temporary fencing will be used for personnel safety and also to designate the construction equipment parking area, the material laydown area, and the actual construction area. See the appropriate drawing listed in Appendix D.

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**0180-4. GATES**

- 4.1 Perimeter gates are used to accommodate pedestrian, vehicle or railroad traffic. All gates shall have provision for locking.
- 4.2 Some main vehicle entry gates may require a dual gate system to form a vehicle trap. Operational requirements for dual gate systems are as follows. Only one gate is opened at any time when admitting a vehicle. The first gate opens, thus letting the vehicle enter the trap, and then the first gate closes. After the guards have checked the vehicle, the first gate remains closed and the second gate is opened to allow the vehicle to enter the secured plant area. The normal position of both gates is the closed position. Opening and closing of gates is accomplished through a manually controlled motorized drive. Gates shall be hardened to preclude forced entry by an unauthorized driver using the size of vehicle designated in the design criteria. Design shall accommodate entry of large construction vehicles (such as cranes) either through the main gate, the railroad gate, or an emergency gate. All vehicle gates shall be of the sliding type.
- 4.3 Vehicle monitoring facilities and other facilities located along perimeter fences must be designed so as not to compromise security features.

**0180-5. VEHICLE BARRIERS**

- 5.1 **Concrete Vehicle Barriers** Precast reinforced concrete barriers (jersey bounce) are normally used around the facility perimeter to prevent vehicle access to the perimeter security fence. The ends of the barriers shall be provided with steel fittings to allow interlocking of adjacent units. Installation of the barriers may include a ditch immediately outside the barrier perimeter. The depth and configuration of the ditch shall be as required by the design criteria and such that it will aid in slowing vehicles before they reach the concrete barrier.
- 5.2 **Moveable Vehicle Barriers** At gates where fixed vehicle barriers are not acceptable, the design criteria may require installation of a movable vehicle barrier. Movement of the barrier to open and close the entrance to vehicle traffic shall be remotely controlled by security personnel from inside the guard station.
- 5.3 **Bollard (Post) Vehicle Barrier** Bollard vehicle barriers are used to prevent vehicles from crashing into facilities and to keep vehicles at a distance from buildings to minimize car-bomb threats. The barrier is composed of many bollards (or posts) sticking up from the ground. The bollards shall be laid out to maintain a neat appearance. Specific design requirements will be given in the design criteria.
- 5.4 **Aircraft and Helicopter Barrier** If the placement of cable and pole barriers to preclude the landing of light aircraft and helicopters near a secured facility is required, such requirement will be identified in the design criteria.
- 5.5 **Railroad Barrier** Vehicle barriers and train derailleurs are required at railroad entry points into protected areas.

**0180-6. GRADING, DRAINAGE, AND ROADS**

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- 6.1 **Grading of Alarm Corridor** Where ponding of water or freezing of water ponds might affect the operation of the perimeter detection system, the area shall be graded to provide drainage.
- 6.2 **Road Systems** Roads will be constructed in accordance with the design criteria. Designs for entrance roads, patrol roads, and parking areas shall also incorporate the security requirements set forth in this section.
- (a) **Entrance Roads** Roads providing access to facility areas shall be designed to prevent a direct approach to the gate following high speed acceleration. The road design shall utilize a curve or other means to reduce the ability to accelerate to a high speed for the purpose of penetrating the gates or vital facilities.
  - (b) No portion of an entrance road shall be located so near the security fence as to provide easy access to the fence by a vehicle.
  - (c) **Patrol Road** Security patrol roads shall be provided for the length of all permanent security fences. The center line of the roads shall be approximately 40 feet from the security fence line and within the secured plant area. When required, an unsurfaced patrol road shall be provided outside the animal barrier fence.
  - (d) **Parking** Vehicle parking areas shall be a minimum distance, as designated by the design criteria (normally fifteen feet), from any security fence, security building, or sensitive building.

**0180-7. SECURITY BARRIER PENETRATIONS**

- 7.1 Pipe penetration through or under perimeter fences shall be designed so that the maximum open area is 96 square inches with no more than one dimension greater than six inches. Some security systems may require pipes containing flowing liquids passing through the alarm corridor, to be buried a minimum of five feet below grade.
- 7.2 See Section 1630 5.5 and 1630 3.2 for requirements for penetration of security barriers by electrical ducts, cable trays, and utility corridors.

**0180-8. PERIMETER LIGHTING SYSTEM**

- 8.1 The lighting system shall be designed to allow visual observation by the guards and, where required, accommodate camera recording. Specific illumination, contrast, and layout requirements will be given in the design criteria.

**0180-9. CCTV SYSTEMS**

- 9.1 When the design of the security system includes a CCTV system, cameras suitable for the particular operating environment shall be selected. The sensitivity, coverage, and operation of the system will be specified in the design criteria.

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**0180-10. INTRUSION DETECTION SYSTEMS**

- 10.1 Intrusion detection systems are custom-designed for each facility. Specific requirements will be identified in the project design criteria.

**0180-11. MAIN GUARD STATION**

- 11.1 **General** All facilities requiring a perimeter enclosure and/or intrusion detection system shall incorporate a main guard station into the design as directed by the design criteria. The main guard station should be strategically located on the perimeter boundary and should support the guard force strength assigned to protect and control facility security functions. Specific features and functions must be determined on a case basis, but will generally include and/or consider the following features: (a) facility layouts, (b) guard desk, (c) facility entry control for both personnel and vehicles, (d) either a CSCC or an interface with an interior CSCC, (e) a portal and package monitoring system, (f) a signal retransmission cable system, (g) an antenna system, and (h) an emergency SACS.
- 11.2 **Layouts** The main guard station layouts shall consider, as a minimum, the number of employees requiring access on a daily basis, queuing of personnel during daily arrivals and departures, handling and detecting contraband and/or unauthorized material carried either into or out of the facility, protection of security forces, relationship to vehicle entry and exit control point(s), proximity and distance to an existing or planned Security Alarm Control System, handling of uncleared visitors, and the need for storage of security force materials and equipment.
- 11.3 The layout should be strategically placed and sized to provide protection to security personnel, observation and control of all vehicle and pedestrian traffic, inspection and monitoring of hand-carried packages and support documentation, and handling of visiting and/or uncleared personnel. Incorporation of other security features, such as a CSCC, must be considered on a case basis and will be identified in the project design criteria.
- 11.4 **Facility Entry Control** The main guard station shall be designed to function as the primary facility entry control point for personnel and/or vehicles. The basic entry provisions will be designed to meet the requirements of DOE Order 5632.1C as they apply to the security areas specific to the operating facility functions.
- 11.5 **Central Security Control Center** The CSCC in the facility serves as a security center. This plant control center shall be equipped to handle security. Economical application of other reliable technology should be explored for future communication channels.
- 11.6 **SACS** The SACS is a computer-based security system which provides real-time monitoring, evaluation, and tactical data for guard action. These same data may also be relayed to the INEL Central Alarm System.
- (a) The size of the SACS will depend on the number of alarm data and video assessment channels needed as identified in the design criteria. The SACS provides the operator with information through a combination of visual and/or auditory devices.

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- (b) The system shall be designed to obtain and display as much information as required by the design criteria to provide:
    - 1. Immediate alarm and alarm assessment information covering sensitive plant areas.
    - 2. Direct communications with the INEL Central Alarm System.
    - 3. Electronic recording of SACS activities for future evaluation.
  - (c) Typical functioning of a SACS system is as follows. When an alarm occurs at any plant location or perimeter zone, an audible tone alerts the operator. The SACS interprets the alarm condition and matches it to its assigned priority, simultaneously transmits the alarm information, initiates recording, and presents the information to the operator. Additionally, live and recorded closed-circuit television is automatically switched to the alarm video monitors. With all pertinent alarm data presented to the operator, the established security alarm response procedures can be performed.
  - (d) Where required by the Work Scope, the AE shall develop detailed criteria, functional and logic diagrams, plant facility, building, and perimeter zone maps, sensor locations, etc.
  - (e) The SACS system shall be located in a hardened room. The hardened room shall be located away from normal vehicular or pedestrian traffic and shall require rigid entry control. Any HVAC vents or registers shall provide for timely closing from within the room in the event that gas bomb attempts are made.
- 11.7 **Portal and Package Monitoring System** All hand carried items are subject to search and examination by security personnel. Systems and devices designed and/or specified for these uses may consist of, but not be limited to, the following: X-ray, metal detectors, fission detectors, and beta-gamma detectors. Requirements for a given facility will be given in the design criteria.
- 11.8 **Security Signal Transmission Cable System** Cable systems transmitting critical security information and security alarms shall be protected from signal tapping, tampering, or sabotage. The security system circuitry will have self-monitoring capabilities so as to alarm in the event of signal tapping, tampering, or loss of circuit continuity.
- (a) When feasible, cable vaults shall be located within the security fence. When this is not feasible, special design features, such as the use of CCTV surveillance, may be required.
  - (b) **Junction Boxes** Distribution junction or terminal boxes of a small size shall be spot welded closed to prevent easy access. Larger junction boxes (or terminal boxes) shall be fitted with alarm switches and locked with approved security key locks. The boxes shall be located to minimize accessibility.
  - (c) **Direct Burial Cables** Perimeter alarm cables located in the perimeter zones need not be encased in conduits. When direct burial cables are used, they shall be covered



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with sand before the trench is backfilled. Cables crucial to system operation (as identified in the design criteria) shall be protected by a layer of red concrete about one foot from the surface.

**11.9 Antenna System** Where required for a fixed station, the antenna system shall be designed at a height appropriate for INEL area communications as specified in the design criteria. Each antenna above the building or tower shall have lightning protection per NFPA 780. Coaxial cable shall be MIL SPEC quality. Cable connectors shall be weatherproof or covered with appropriate weatherproof coax seal. The antenna shall be designed for wind loading. Aircraft warning lights shall be provided where necessary to meet FAA requirements.

**11.10 Emergency SACS** Where required by the design criteria, a smaller back-up SACS shall be installed at major SNM secured storage areas. The system shall provide monitoring of critical areas and provide a selected number of alarm and video signals to the INEL Security Headquarters ).

**11.11** The operating modes, parameters, etc. will be specified in the design criteria.

## **0180-12. SECONDARY GUARD STATIONS**

**12.1** Secondary guard stations are located at auxiliary plant entrances to control access of vehicles and/or personnel. The equipment or security capabilities for a typical secondary guard station will include (a) stand-up work table, (b) communication systems, (c) gate controllers, (d) card readers, (e) badge rack, and (f) vehicle barrier control.

## **0180-13. INTERIOR SECURITY SYSTEMS**

**13.1 SNM Storage Facility** SNM storage systems, in general, must provide safe and secure storage of SNM. SNM storage facilities must meet the special requirements of DOE M 5632.1C. The storage facility must, as a minimum, provide barriers preventing unauthorized access to the fuel, establish a clean and controlled environment for the fuel storage and handling, and support appropriate fuel inventory, accounting, and quality control programs. Additional features to prevent overt attempts at theft or damage to SNM must be considered on a case basis. The specific requirements will be defined in the design criteria.

**(a) Physical Security Requirements** All physical features incorporated into the design must be considered in terms of providing a graded and performance-evaluated physical protection system; the roof, walls, and doors must equally satisfy the delay and intrusion prevention requirements specified in the design criteria.

**(b)** Additional requirements may apply, depending on the category of materials to be stored. These categories are defined in DOE G 5632.1C-1 Attachment 7. A graded approach to the design should be taken to provide a design keyed to the appropriate material storage designation.

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- (c) **Door Design** In addition to the requirements discussed in the preceding paragraphs, door design must provide controlled personnel and vehicle access, accommodate the vehicles servicing the storage facility, and prevent physical tampering.
- (d) **Vehicle Barriers** The need for vehicle barriers must be determined on a case basis. When vehicle barriers are required, they shall conform to the requirements of DOE M 5632.1C-1, Chapters VI and VII.
- (e) **ADS** When an ADS is required, its configuration and control methods will be determined as a part of the security system design and will be specified in the design criteria.
- (f) **Other Building Features** The requirements for lights, heating and ventilating, fire protection, and emergency power will be identified in the project design criteria. Factors that the AE shall consider in the facility design are location, existence of an outside cleared area, location within an administratively controlled area, designation as a materials access area, protected area, or exclusion area, availability of support systems at the operating facility, etc.
- (g) **Security Alarm Systems** Security alarm systems provided for classified matter, large property interest, or SNM storage should be consistent with the use, amount, and category of material to be stored and the degree of physical protection required as identified in the design criteria. These systems may include the following: alarms, video monitors, specialized entry control and identification systems, special lighting (infra-red, for example), anti-tamper devices and tamper detection systems, intrusion detection systems, activated denial systems, etc. All systems must be designed to communicate with the SACS.

#### 0180-14. SAFEGUARDS AND ACCOUNTABILITY MEASUREMENTS

**14.1** **Safeguards Computer and Document Storage Facility** Safeguards computer and document storage facilities shall conform to requirements set forth in DOE G 5632.1C-1, DOE 5639.6A, and DOE 1360.2B.

- (a) **Security Systems, Alarms, and Video Monitors** The safeguards computer facility shall be protected by alarms and video monitors. Where feasible, cables should be run under a false floor. Cables run under a false floor shall comply with ANSI/NFPA 70 and 75. Classified circuits shall be enclosed in metal conduits. Security systems, alarms and video monitors shall meet the criteria for a vault-type room if there is open storage of classified materials.
- (b) **Entry Control** An entry control system, such as a card reader, shall be required for personnel admission into a safeguards computer facility.

**14.2      Measurement Instrumentation**

- (a) **SNM Diversion Detection** All possible SNM routes from a facility should be identified, and access denied in the design through use of SNM detectors or anti-syphon devices, etc., where possible, and alarm instrumentation installed on the remainder. All authorized routes should be controlled and monitored for material control and accountability purposes.
- (b) Samplers and sample transfers to the laboratory areas should be remotely operable, wherever possible. Alternately, if hands-on samplers are used, they should be access controlled, monitored by flow or other alarms, and monitored by motion-detector-equipped CCTV.
- (c) Process vessel levels, transfer valves, and transfer routes should be monitored and alarmed on vessels used to isolate or store static inventory solutions and on vessels used to measure material throughput or inventories. Solutions in these vessels must be capable of being mixed to a uniform concentration and sampled in a representative manner. Vessel and piping configurations should support calibration activities.
- (d) Solid waste removal systems should be designed to ensure that they are not used as SNM diversion routes. Verifications may take place at the facilities or at an alternate location with adequate security controls.
- (e) The design should be reviewed for identification of other sensitive areas requiring access controls, alarms or motion detectors equipped with CCTV surveillance.
- (f) Vital sensors shall be installed with anti-tamper devices and alarms, or physical barriers with entry control shall be provided.
- (g) **Signal Transmission System** Safeguards measurement circuit cables will be installed to a level of protection defined by the project design criteria.
- (h) **Remotely Located Computer Terminal** SNM classified accountability computer terminals located in general access areas shall be secured through access control, security alarms, and physical security. All display equipment shall be oriented to prevent viewing of the display data by passing personnel. Circuits shall be protected to prevent unauthorized monitoring.
- (i) **Other Accountability Equipment** Other equipment and documents used in classified accountability work, such as weighing, radiation monitoring, quality control, etc. shall be located in a secured room. It is likely that these equipment items will be located in the same room housing the SNM accountability terminal and that the above requirements for security shall apply.

**0180-15. SECURITY BOOTHS**

- 15.1 Where the design criteria require that high security risk areas be protected by security booths, the design of these security booths and associated controls for manual and

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remotely controlled locks shall meet both safety and security requirements. All modes (i.e., normal operating, emergency exit, security alert, and safety emergency evacuation) shall be considered. Security booth doors are used to control personnel entrance and exit. Emergency exit (nonbooth) doors shall be provided to accommodate fire/criticality evacuation.

- (a) **Normal Entrance/Exit Mode** For normal authorized entrance and exit, the booth door will be used. When a valid identification card is read by the security monitoring system, the acknowledged validation will release the magnetic door lock and allow the person to enter or leave through the controlled entrances. Additional security is provided by associated positive identification and video surveillance systems.
- (b) **Emergency Exit Mode** Emergency exit doors (nonbooth doors) shall be designed to facilitate rapid exit using UL approved exit hardware. Relocking of the door will be automatic. Nonbooth doors shall not be provided with entrance hardware.

Booth doors shall be designed with proper exit hardware to accommodate emergency exit without use of an identification card. Such exit shall be alarmed.

- (c) **Security Alert Mode** To cope with a security threat (terrorist intrusion), provisions shall be made to prevent the booth door from being opened from the outside during a security alert.
- (d) **Safety Emergency Evacuation Mode** In the event a fire alarm or criticality alarm is activated, it shall be possible for personnel to evacuate the area through the nearest door, including emergency exit (nonbooth) doors.

**0185-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- National Fire Protection Association (NFPA) Codes and Standards.
- DOE 420.1, Facility Safety
- DOE 440.1, Worker Protection Management for DOE Federal and Contractor Employees
- Other DOE Orders and statutory requirements, not listed above, that contain requirements of a more limited extent relating to the DOE Fire Protection Program.

**1.2 Referenced Codes and Standards**

- DOE-HDBK-1062, DOE Fire Protection Handbook.
- DOE-STD-1088, Fire Protection for Relocatable Structures (See Appendix-K)
- DOE-STD-1061, Fire Protection Design Criteria (in draft)
- Factory Mutual Loss Prevention Data Sheets.
- American Petroleum Institute Guidelines.
- Product Directories of Underwriters Laboratories, together with the periodic supplements (UL).
- Factory Mutual Research Corporation Approval Guide (FM)
- UFC, Uniform Fire Code (ICBO)

- 1.3 Other Sections of the AES Which Include Fire Protection Criteria** Refer to 0110, Architectural; 1530, Fire Protection Systems; 1535, Fire Water Storage and Distribution, and 1670, Communications and Alarm Systems, for additional fire protection criteria.

**0185-2. CODE OF RECORD AND RETROACTIVE APPLICATION OF CODES AND STANDARDS**

- 2.1** The fire protection related codes and standards in effect when facility design commences will be the "Codes of Record" for the facility and will remain in effect for the lifetime of the facility.
- 2.2** **Exception:** If there is a significant life safety hazard that endangers building occupants or the public, the facility shall be upgraded to the requirements of the current edition of the code or standard, as it relates to the significant hazard.

**0185-3. DEFINITIONS**

- 3.1** The following definitions apply at all DOE-ID facilities:
- 3.2 DOE-ID Authority Having Jurisdiction** For the purposes of this manual, and where referenced in the codes and standards, the DOE-ID AHJ shall be as defined by the Fire Protection Program Manager.

- 3.3 OC Facility FPE The OC Facility FPE is a clearly identified individual for each DOE-ID facility whose duties include the responsibilities listed for a facility fire protection engineer.
- 3.4 Fire Protection Panels
- (a) Communication Panel A UL listed and/or FM approved fire panel that transmits all information from the reporting panels to the DOE-ID Site Alarm System, responsible fire department, or other constantly attended location. Communication may be via hard wire conductors, fiber optic cable, or phone lines.
  - (b) Reporting Panel A UL listed and/or FM approved fire panel that takes field devices (manual alarm pull stations, smoke detectors, tamper switches, flow switches, etc.) to a common point with local annunciation.
- 3.5 Listed. Equipment or materials to which has been attached a label, symbol, or other identifying mark of a recognized testing organization.

#### 0185-4. DESIGN REQUIREMENTS

##### 4.1 OC Project Management Design Responsibilities

- (a) Design requirements for fire protection systems including the hazard class, type of protection to be provided, zoning of protection or alarm systems, and system flow rates, will be provided by the OC Facility FPE as part of developing project design criteria. Requirements for special facilities or systems shall be provided by the OC Facility FPE and included in the project design criteria. All plans and specifications shall be reviewed by qualified personnel competent to assess compliance with fire safety and fire protection requirements.
- (b) The OC Facility FPE shall determine whether a design meets applicable government regulations, codes and standards, subject to approval/acceptance of all final or as-built design drawings by the OC Cognizant FP.
- (c) For detection and alarm systems, the OC Project Manager will obtain the system requirements from the OC Facility FPE and the C&AO (Life Safety, Security Systems, and Configuration Management Systems) for the specific system, and will submit these to the AE as design requirements. The C&AO will issue hardware and software address assignments as applicable for the integration of the system to the site-wide system prior to Title II design.
- (d) The OC Project Manager will include the responsible unit of the C&AO as a reviewer in the formal Design Review. The OC Facility FPE will also review this information as part of the formal Design Review, and the OC cognizant FPE.

- (e) The OC Facility FPE will provide the containment criteria for Liquid Run-Off Control as part of developing project design criteria with reference to Section 110-3.17.
- (f) All designs for telecommunications facilities shall be coordinated with and reviewed by the Telecommunications Systems Unit of the OC in formal design review process.

#### 4.2 OC Communications and Alarms Organization Design Responsibilities

- (a) The C&AO shall assign unique event numbers to alarm communication panels, and shall be responsible for event number software entry and hardware address assignments on the site fire alarm computer, with the approval of the OC Cognizant FPE.
- (b) Final connections to existing systems will be performed by the C&AO. In cases where Davis-Bacon requires work to be performed by the Subcontractor, the C&AO must be present to witness the tie-ins.
- (c) The C&AO will perform the SO test on all new systems prior to being placed in service. The installation contractor must be present to perform any additional corrections or adjustments on the new system. This SO test must be approved prior to final payment to the installation Subcontractors.

#### 4.3 AE Design Responsibilities

- (a) The AE shall provide the OC with drawings and specifications regarding fire protection, suppression and detection systems. These drawings, as a minimum, shall show sufficient information on the drawings and in the specifications for a qualified fire protection subcontractor (as described later) to prepare the detailed design after the construction subcontract is awarded. The AE drawings shall not show detailed design features such as sprinkler head location, pipe sizing within a building, or hydraulic calculations. The AE shall maintain in the project file any information regarding engineering layout of piping and leads required for hydraulic calculations needed to supply the design parameters for the specifications. The drawings and specifications shall be limited to the following information:
  1. Floor plans showing the area(s) to be provided with fire protection.
  2. Required hydraulic density over a specific area.
  3. A current water flow test for water supply data. This must identify the test location (e.g., to the pump, to the main), and shall be dated no more than 12 months prior to the bid package issue date. This information shall be provided by the OC Facility FPE.
  4. Riser and water supply connection locations.
  5. Hose station locations.
  6. Underground fire main tie-in locations.
  7. Inspector's test and special drain locations.
  8. Sleeve locations in all masonry walls and floors.

9. Fire alarm tie-in locations.
10. General location of obstructions, such as major ductwork, hatches, etc.
11. For special gas extinguishing systems, the location of items such as louvers, doors, automatic door closures, HVAC systems, and power supply and alarm tie-in locations shall be shown.
12. Specifications shall include the minimum size of any underground main.
13. Specifications shall specify the initial point in the system for hydraulic calculations. Generally, calculations will be required to extend to the nearest water flow test point.

**4.4 Subcontractor Design Responsibilities** The AE shall include the following requirements in the specification for fire protection systems:

- (a) The Subcontractor shall include proof of state-required certification or NICET certification as part of the bid package. The Subcontractor shall be responsible for preparing installation drawings using an individual in responsible charge of the design who holds a minimum NICET III certification.
- (b) The Subcontractor shall be responsible for preparing sprinkler system hydraulic design and other calculations (e.g., sway bracing), and shall provide the calculations, applicable vendor data, and system drawings which conform to NFPA 13 requirements for working drawings for review and approval to the OC, and as part of the as-built submittal package.
- (c) Upon project completion, the Subcontractor shall provide final calculations, applicable vendor data, and as-built system drawings.
- (d) The Subcontractor will provide documentation to provide long term maintenance and troubleshooting. The documentation supplied will vary with the type of system installed, but will include as a minimum as-built drawings including but not limited to one-line system drawings, floor plans and equipment layout drawings.
- (e) The Subcontractor is responsible for field verification of the design to eliminate problems of obstruction or interferences.

**4.5 Qualified Subcontractor** A qualified fire protection subcontractor is any subcontractor whose primary business is the design and installation of fire suppression and/or alarm systems. For design and installation of sprinkler systems at DOE-ID facilities located in Idaho, the subcontractor shall show proof of current certification as a certified fire protection sprinkler contractor as required by the State Fire Marshal.

**0185-5. GENERAL REQUIREMENTS**

- 5.1** Unique processes or unproven technologies, which are not addressed by the mandatory codes and standards listed in this manual shall be protected by isolation, segregation, or use of special fire control systems (inert gas,



explosion suppression, etc.). Design criteria shall be as determined by the OC Cognizant FPE. In addition, devices for limiting or controlling the effects of a fire (filters, blast walls, emergency shutdown systems, etc.) shall be provided as appropriate.

- 5.2 Contractors having design responsibility shall follow DOE and nationally recognized standards. The incorporation of fire protection and life safety features in buildings is an important factor of good engineering. These features shall be considered in the original concept. The basic fire protection criteria for design of new facilities and modifications for existing facilities are outlined below.
- 5.3 **Standards** General fire protection design requirements are defined by DOE Order 420.1, in Sections 0110 and 1530 of this manual, and the national codes and standards.
- 5.4 **Improved Risk Concept for Fire Protection Systems** Fire protection design for facilities shall incorporate an "improved risk" level of fire protection as directed in DOE 420.1.
- 5.5 DOE Fire Protection systems shall meet or exceed the minimum requirements established by the National Fire Protection Association. Basic requirements shall include: a reliable water supply of acceptable capacity for fire suppression; noncombustible construction of an acceptable nature for the occupancy of the facility; automatic fire extinguishing systems; a means to summon the emergency response force in the event of a fire; and a means to notify and evacuate building occupants in the event of a fire. For areas subject to significant life safety risks, serious property damage, program interruption, or loss of safety class equipment as defined in the relevant facility SAR, additional protection measures may be deemed necessary as determined by the AHJ.

#### 0185-6. FIRE HAZARDS ANALYSIS

- 6.1 **Fire Hazards Analysis** An FHA shall be conducted for DOE-ID facilities by the OC Cognizant FPE as required by DOE Order 420.1.

#### 0185-7. FIRE PROTECTION DESIGN FOR VITAL AREAS

- 7.1 Fire protection systems for vital programs shall incorporate a higher standard of protection than the "improved risk" level. Areas of high value or of high program importance such as computer areas or control rooms should be provided with a rapid response system in addition to sprinklers when determined necessary by the OC cognizant FPE.
- 7.2 Fire protection design for telecommunications, alarm, electronic computer/data processing facilities, and similar systems such as instrument rooms, control rooms, vital computer rooms, shall be as specified in FM Data

Sheet 5-32 and NFPA 75, Standard for the Protection of Electronic Computer Data Processing Equipment.

- 7.3 In areas where a fire could cause damage to a safety class system and where no redundant safety capability exists, a redundant fire protection system shall be provided for the safety class system. Fire suppression systems or safety systems shall be designed such that an actuation will not damage the safety class system.

#### **0185-8. STORAGE OF MATERIALS**

- 8.1 Storage facility design shall ensure that sufficient storage space is provided to allow safe, proper storage with minimum fire risk in accordance with the NFPA 231 series codes.
- 8.2 Special storage provisions shall be made for materials such as flammable and combustible liquids (e.g., paints, solvents, fuels, and oils), lumber, compressed gases, certain reactive chemicals, corrosives, and explosives in accordance with applicable codes and standards.
- 8.3 Compressed gas cylinder storage that is located outside may be stored in a lean-to type structure. The structure shall be well ventilated and have a roof of non-combustible material. Intermixing of different types of compressed gas cylinders is prohibited. Oxygen gas cylinders shall be separated from other types of cylinders with a one-half hour minimum rated block wall six-feet high, or taller than the adjacent cylinders. If no separation is desired by a block wall, a minimum of 20 feet separation from the closest stored cylinders is required. There shall be no windows, louvers, ducts or other openings in the wall directly above the compressed gas storage area. A minimum of ten feet shall be maintained from any doorway to the compressed gas storage area. Refer to NFPA 51 for information on oxygen gas cylinders for outside storage.
- 8.4 Adequate space shall be provided for visibility and ready access to all first aid, safety, and fire equipment such as emergency respirators, safety showers, emergency valves and switches, fire alarm pull stations, sprinkler risers, fire hose connections, and fire extinguishers.

#### **0185-9. FLAMMABLE LIQUID STORAGE AND HANDLING FACILITIES**

- 9.1 NFPA 30, Flammable and Combustible Liquids Code, is the basic standard for flammable and combustible liquids.
- 9.2 In addition to meeting NFPA 30, the location and spacing of flammable and combustible liquid storage tanks and piping shall conform to UFC Article 79, and FM Data Sheet 7-29. Outside storage will be maintained an adequate distance from important buildings or structures as per required national codes and standards.

- 9.3 Laboratory operations involving flammable/combustible liquids shall conform to NFPA 45.

**0185-10. LIGHTNING PROTECTION** Refer to Section 1600-5.

**0185-11. BATTERY ROOMS**

- 11.1 Battery banks of non-sealed cells should be located in a room separated from the rest of the building by noncombustible walls and shall be provided with an eye wash station. When the fire exposure to or from other building occupancies warrants fire rated construction, the fire resistance rating shall be as specified in the project design criteria. Refer to Section 1660 for additional requirements.
- 11.2 Design shall ensure that hydrogen concentrations do not exceed 25% of the lower explosive limit (approximately 1% for hydrogen). Forced ventilation is not normally required.

**0185-12. ELECTRICAL SWITCHGEAR ROOMS**

- 12.1 Electrical switchgear rooms shall comply with the requirements of the UBC, NEC and Life Safety Code. They shall be provided with smoke detection for rapid discovery of arcing or fire. Combustible construction materials, other than insulation on wiring and backboards, shall not be allowed in these rooms.
- 12.2 With compliance with items above and if two hour rated barriers separate the switchgear rooms from the remainder of the facility, sprinklers may be omitted from high voltage switchgear rooms (above 480 V) unless directed by the project design criteria. Sprinklers should be provided in 480 V and lower switchgear rooms in a sprinklered building.

**0185-13. TRANSFORMER INSTALLATIONS**

- 13.1 Fire protection requirements for fire detection, suppression, and alarms shall be determined using FM Data Sheet 5-4. Refer to Section 1630-4.

**0185-14. STANDBY/EMERGENCY POWER SUPPLY SYSTEMS**

- 14.1 Precautions regarding fire suppression systems discussed in NFPA 110 shall be considered. Refer to Section 1646-3.

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**0190-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- c AES 0100-1, Codes and Standards
- c DOE Order 420.1, Facility Safety

**1.2 Referenced Codes and Standards**

- c DOE/EV/1830-T5, A Guide to Reducing Radiation Exposures to ALARA.

**0190-2. GENERAL**

- 2.1 Where a conflict occurs between standards or codes the conflict shall be brought to the attention of the Operating Contractor or DOE-ID for resolution. Conflicts regarding the AE Standards shall be resolved as directed in Section 0010-4.
- 2.2 Facility design shall be such that due consideration is given to preventing the release of hazardous material to the environment. All facilities shall be designed to ensure compliance with applicable federal standards for the protection of the environment.

**0190-3. HAZARDOUS WASTE**

- 3.1 Design shall include adequate provision for the safe collection, storage, and ultimate treatment of hazardous waste by an approved method that will minimize hazardous waste disposal needs.
- 3.2 **Liquid Waste Containing Radioactivity** Service wastes, such as discharges from mop sinks, lab sinks, process stream condensate, process cooling water, or similar type service wastes that have the possibility of containing radioactive contamination, shall be connected to an existing waste diversion system or provisions made to provide a similar type detection, diversion, and holding system. Holding tanks shall be designed for mixing, sampling, and pump out. The existing diversion system at ICPP continuously monitors and will alarm and automatically divert the contaminated waste to a holding tank for processing as may be required. All diversion monitors in new design shall have an alarm in the operating area and other areas as may be necessary.
- 3.3 **Radioactive Laboratory Wastes** A special drain connected to the process waste system shall be provided for disposal of radioactive laboratory and service wastes.
- 3.4 **Process Wastes** Liquid process wastes shall be collected and sampled near the source of generation before batch-wise discharge through appropriate pipe lines or by tank transfer to a liquid waste treatment plant or area. These wastes shall be individually collected at that facility in storage tanks equipped with spargers, sampling and volume measuring devices, and transfer system. Process waste storage tanks and transfer lines shall be designed and constructed so that any leakage will be detected and contained before escape to the environment occurs. Transfer lines shall have inspection collection pits at practical intervals

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into which leakage can drain by gravity. Minimum design shall include adequate provision for the safe collection, packaging, storage, and disposal of solid waste resulting from facility operations.

- 3.5** **Lead** The use of lead at the INEL is controlled. Prior to using lead in an engineered system or component, consideration should be given to the use of lead substitutes, prevention of contamination of lead and the use of existing contaminated lead. The intent of these requirements is to minimize (and eliminate when possible) the generation of hazardous wastes.
- 3.6** All engineering designs requiring shielding should consider the use of substitutes, such as steel which only requires 50% additional thickness to provide the same shielding. When it is not possible to use a substitute, as in a system with severe space constraints, consideration should be given to protecting the lead from becoming contaminated (i.e., steel jackets) and for ease in removing the lead when the system is dismantled or modified.

**0190-4. PREVENTION OF NUCLEAR CRITICALITY ACCIDENTS**

- 4.1** Design of nuclear criticality prevention provisions, including equipment and procedures, shall meet the requirements of DOE Order 420.1 .

**0190-5. RADIOLOGICAL SAFETY**

- 5.1** Facilities shall be designed to minimize personnel exposures, provide adequate radiation monitoring and alarm systems, and accommodate health physics activities, such as decontamination, radiation analysis, materials handling, job control, etc. To the extent feasible, design objectives for dose-equivalent control are to be established to maintain complete containment of dispersible radioactive materials and to prevent the generation of any airborne radioactive materials in areas that are or may be occupied.
- 5.2** DOE/EV/1830-T5, A Guide to Reducing Radiation Exposures to ALARA, provides additional guidance that shall be considered for radiological design.

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## 0200-1. CODES AND STANDARDS

### 1.1 Applicable Codes and Standards

- AES 0100-1, Codes and Standards

### 1.2 Referenced Regulations, Codes and Standards

- CERCLA, Comprehensive Environmental Response, Compensation, and Liability Act
- RCRA, Resource Conservation and Recovery Act
- TSCA, Toxic Substance Conservation Act
- AASHTO Standards.
- NESC, National Electrical Safety Code
- State of Idaho Transportation Department, Division of Highways, Standard Specifications for Highway Construction
- Union Pacific Railroad, Technical Specifications for Industrial Tracks
- DOE Order 420.1, Facility Safety
- DOE-STD-1020, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities
- DOE-STD-1021, Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components
- 40 CFR 270.14, EPA Administered Permit Programs: The Hazardous Waste Permit Program--Contents of Part B: General Requirements
- 40 CFR 761.65, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Prohibitions--Storage for Disposal

## 0200-2. GENERAL

2.1 **Surveying** The INEEL has been plotted with a Mercator system of coordinates and is contour-mapped in 10 ft intervals of elevation. A mosaic, or aerial map, and various geological plots are also available. When this information is needed for design purposes, the AE will be furnished available prints and data upon request to the OC. Actual elevations and coordinates shall be shown on the drawings and shall be determined from the present ground control system in use at the INEEL. Information on past and present control systems is included in Appendix J, Surveying Control on the INEEL.

2.2 **Site Conditions** When information concerning site conditions (topography, soil conditions, subsurface rock formations, road and structure locations, etc.) is not available but is essential for design purposes, the AE shall request the necessary information from the OC or DOE-ID.

2.3 **Soil Conditions** The following tables summarize data taken from geotechnical reports, well drilling logs, and test hole logs. The 1997 UBC soil profile type indicated shall be used in UBC seismic calculations unless location specific soil data or a geotechnical report indicate otherwise. The minimum, average and maximum depth to basalt based on available information at each major facility is also included. If depth to basalt is critical for a new building or

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structure, the depth to basalt at the specific location should be verified by test holes, test pits or another appropriate method.

Facility	Description of Soil Layers		Surface layer thickness (ft)	Depth to Basalt (ft) <sup>1</sup>		
	Surface layer	2 <sup>nd</sup> layer		Min	Avg	Max
ANL	Sandy silt	Silty gravel	0-1.5	5	15	38
CFA	Sandy silt	Sandy silt	0-2	7	19	27
INTEC	Silty gravel	Sandy gravel	0-1	17	37	64
NRF	Silty gravel	Sandy gravel	0-2	4	27	50
RWMC	Silt	Sandy gravel	1-5	2	10	26
TAN	Silt	Clay	5-10	6	39	63
TRA	Silty gravel	Sandy gravel	0-1	14	48	73
WROC (PBF)	Sandy silt	Silty gravel	0-2	6	7	8

1. Depth to basalt is from monitoring well drill logs.

Facility	97 UBC Soil Profile Type	
	Based on SPT	Based on Shear Wave Velocity
ANL		SD
CFA		SD
INTEC	SC <sup>1</sup>	SC
NRF	SC <sup>1</sup>	
RWMC		SD
TAN		SD
TRA		SD
WROC		SD

1. Basalt was extrapolated to a depth of 100 feet to assess the shear wave velocity.

Note: Blank cells indicate insufficient data.

- 2.4 **Flood Design** Flood design shall be in accordance with DOE-STD-1020. The preliminary INEEL Regional Design Basis Flood (DBFL) elevations are as follows:

Performance Category		PC-1	PC-2	PC-3	PC-4
Recurrence Interval	100-yr	500-yr	2000-yr	10,000-yr	100,000-yr
DBFL Elevation above sea level (ft) <sup>1</sup>					
CFA	Above flood plain	Above flood plain	Above flood plain	Above flood plain	Above flood plain

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Performance Category		PC-1	PC-2	PC-3	PC-4
Recurrence Interval	100-yr	500-yr	2000-yr	10,000-yr	100,000-yr
<b>DBFL Elevation above sea level (ft)<sup>1</sup></b>					
INTEC					
NRF					
PBF	Above flood plain	Above flood plain	Above flood plain	Above flood plain	Above flood plain
RWMC					
TAN					
TRA					

Note: Blank cells indicate that information is not yet approved or available.

1. The flood elevations are based on the North American Vertical Datum of 1988 (NAVD88).

- 2.5 An alternate design strategy based on trade-off studies and evaluations comparing cost and schedule impacts of siting above the DBFL to risks and consequences of failure may be developed. Alternate strategies include:
- (a) Modify of the flood,
  - (b) Harden SSC or site,
  - (c) Develop alternate design based on emergency action plan.
- 2.6 Flood design for RCRA facilities shall be in accordance with 40 CFR 270.14.
- 2.7 Flood design for TSCA facilities shall be in accordance with 40 CFR 761.65.
- 2.8 **Surface Drainage** Design for surface drainage from local precipitation shall be in accordance with DOE-STD-1020. The INEEL site specific local precipitation standard for a 25 year, 6 hour storm is 1.4 in. total. All paved areas adjacent to buildings and structures shall have a 1% minimum slope away from the buildings or structures. Unpaved areas shall be 2% minimum. Concrete slabs, door stoops, truck ramps, etc., shall be sloped at least 2%, where feasible. Splash pads shall be provided below roof drains, gutters, etc.
- 2.9 Where an area has a surface drainage plan, all new facilities shall be coordinated with this plan. Where it is likely that surface drainage could involve radioactive or hazardous substances, special features will be required. Such provisions will be identified in the design criteria.
- 2.10 **Excavation** Specifications for excavation work shall require that excavations comply with OSHA Standards, 29 CFR 1926, Subpart P (and Subpart U if blasting is necessary), Subsection 1926.651. Where major or complex temporary support systems (shoring, cribbing, sheet piling, etc.) are required, they shall be fully designed by the AE as part of the design package.
- 2.11 Where identified in the design criteria that hazardous or radioactively



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contaminated materials will be encountered during excavation, the AE shall indicate in the construction documents an estimate of the quantities involved. Methods for removal and disposal will be included by the OC in the subcontract Special Conditions and shall comply with Region 10 RCRA and CERCLA requirements.

- 2.12 **Backfill** Where excavations are backfilled during construction of pipelines, roads, railroads, etc., the material used, the method of placement, and level of compaction shall be designed to prevent unacceptable settlement and to allow adequate drainage if necessary. The backfill around a pipe shall be of a material that will not damage the pipe. See the guide specification titled "Earthwork."
- 2.13 A locator (a.k.a. underground warning tape) ribbon shall be installed above all buried utilities. This locator ribbon shall be 3 inches wide minimum and shall be placed within a zone or 6 to 12 inches below the ground surface or 12 to 18 inches above the utility. The position of the locator ribbon should be based on the depth of the utility, the ease of detection of the utility, the utility materials, and the hazard presented by the utility. The product to be used shall have metal foil which is completely encased in plastic so as to be unaffected by Cathodic Protection Systems and can be easily detected with metal detectors. The ribbon should be printed with the appropriate message of the manufacturer's standard wording.
- 2.14 **Fences** Permanent security fences and temporary construction area isolation fences (temporary security fences) shall be designed in accordance with the appropriate drawings listed in Appendix D. See Section on Security for specific security fencing requirements. See 1639-4.1 for grounding requirements.
- 2.15 **Roads and Parking Lot** Designs for paved roads shall conform to Idaho State Highway Standard Specifications. Typical road sections are shown on the appropriate standard drawing listed in Appendix D. The design should be based upon current or projected usage as identified in the project design criteria. Geometric design of all roads, streets, access drives and parking areas shall comply with AASHTO
- 2.16 Layouts shall be designed for safe rapid movement of emergency equipment. The arrangement of roads and parking lots shall consider the safe evacuation of personnel from the area, pedestrian/vehicle interactions, and access by emergency responders and their vehicles to the site, fire hydrants, control valves or other fire protection equipment. Appropriate guardrails and clear space shall be provided to protect control valves, fire hydrants, flammable gas and liquid storage tanks or dispensing stations, and electrical gear from physical damage.
- 2.17 Where bus service is contemplated for a facility, provision must be made for bus turnaround and loading zone. The minimum allowable turning radius of site buses is 54 feet. Bus turnouts or turnabouts shall be provided at the end of

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emergency access roads. Design of bus turnouts or turnabouts should consider the loads imposed on pavements by turning buses and trucks.

- 2.18 Railroads Designs for railroad tracks shall conform to Union Pacific Railroad Company Standards. Minimum turnout radius shall be number nine. Standard treated ties and tie plates shall be used for all track sections. A typical INEEL track section is shown on the appropriate drawing listed in Appendix D.
- 2.19 Manholes Concrete utility manholes shall be designed with a straight collar section between the top of the manhole proper and the cast iron cover and ring. This will allow for varying the elevation of the manhole cover (by varying collar height) without disturbing the manhole. Typical INEEL manholes are shown on the appropriate drawings listed in Appendix D.
- 2.20 Surface Finishes of Exterior Concrete Slabs Exterior concrete slabs (sidewalks, door stoops, etc.) shall be given a "broom" surface finish or equivalent, to minimize the safety hazard of slipping during freezing weather conditions.

### 0200-3. OUTDOOR SUBSTATIONS

- 3.1 Switchyards, transformer yards, substations, and similar areas shall be protected from entrance by unqualified personnel in accordance with NESC 110.
- 3.2 The transformer yard shall be filled to a depth of 6 in. with 1-1/4 in. minus crushed stone. Grading shall be such that drainage will be to a safe location away from buildings and equipment. Curbing shall be provided. The drainage area shall have sufficient volume to hold all of the liquid from the largest transformer or other large oil filled equipment in addition to the contents discharged from any installed extinguishing system during a 10-minute discharge. Gas or dry type transformers (padmount) are exempt from the yard requirements.

**DOE-ID ARCHITECTURAL  
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**DATE: August 1998****SECTION: 0260****0260-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- AES 01540-1, Codes and Standards

**0260-2. GENERAL**

- 2.1 Refer to Sections 0266, 1540, 1541, 1542, and 1543 for piping material requirements.

**0260-3. INSTALLATION**

- 3.1 **Identification Ribbon** Underground pipelines shall be identified by use of a plastic ribbon or stencil no less than 3 inches in width with a message printed on the ribbon which identifies the actual pipeline contents. Marking tapes or stencils shall be placed on existing lines where they are exposed by trenching operations. The ribbon shall be wrapped around the pipeline at no less than 1 wrap per 3 feet of run. The plastic ribbon/stencil shall be color coded in accordance with the INEEL Guide Specifications.
- 3.2 **Corrosion Protection** Buried metallic piping (other than pipelines operating at high temperatures, such as steam and condensate lines) shall be coated and/or wrapped with materials manufactured for the specific purpose of preventing pipeline corrosion unless supplied from the manufacturer with a satisfactory wrapping or coating. Systems using wrapping materials are preferred over those using coatings only. The protective wrap or coating material used shall resist damage during normal handling and installation of the pipeline. The total applied thickness shall not be less than 45 mils, except for polyethylene coatings, which shall have a minimum thickness of 20 mils. It shall have a minimum dielectric strength of 10 kV or greater. Installation specifications shall provide for repair of damage to the coatings.
- 3.3 Buried pipelines that are subject to high temperatures and require both insulation and corrosion protection (such as steam, condensate, and hot water lines) shall be insulated with a product manufactured for the specific purpose of insulating and protecting hot underground piping.
- 3.4 **Underground Potable Water Pipelines** See Section 0266, Water Distribution Systems.

**0260-4. CONNECTIONS TO EXISTING PIPELINES**

- 4.1 The AE shall identify on the construction drawings the size, material and location of pipe lines to be connected into

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- 4.2 Connections to existing pipelines require an approved procedure to insure the positive identification of the line. The AE shall require the Subcontractor to prepare and submit the procedure to the Contractor for approval. As a minimum, the procedure shall include the following:
- (a) The procedure to isolate to the line at the connection point.
  - (b) Record search to identify pipe size, material and locations.
  - (c) Method of field verification of pipe size, material, and location.
  - (d) A safe work permit.
- 4.3 **Hot Tapping of Existing Pressurized Underground Distribution Piping**  
Where hot tapping of existing pressurized underground piping is necessary, the AE shall require the Subcontractor to supply a written procedure describing the process for installing the hot tap.

**0266-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- AES 1535 Fire Water Storage and Distribution. See Section 1535 for NFPA and FM references applicable to combined firewater and potable water systems.
- Idaho Regulations For Public Drinking Water Systems, State of Idaho Department of Health and Welfare (IDAPA 16.01.08.550)
- Well Construction Standards, Rules and Regulations, State of Idaho Department of Water Resources
- National Sanitation Foundation Listings

**1.2 Referenced Codes and Standards**

- American Water Works Association (AWWA) Standards

**0266-2. GENERAL**

- 2.1 Water supply systems consist of wells, storage tanks, pumps, and distribution piping.

**0266-3. DRINKING WATER SYSTEMS**

- 3.1 By definition, the public water supplies at INEEL are defined as non-transient, non-community public water systems. Design and construction requirements shall be done in accordance with Idaho Regulations for Public Drinking Water Systems. All new drinking water systems and associated equipment will comply with the construction and separation distance requirements in the referenced regulation.
- 3.2 A water main is defined as a water supply line which provides potable water to more than one building.
- 3.3 The following are practices which are permissible per past agreements with the State of Idaho and constitute acceptable existing conditions:
- (a) Potable water mains may be installed in a common trench with fire water and utility water including condensate, steam lines, analytical grade water, boiler feed water, chilled water, cooling water, demineralized water, raw water, and treated water.
  - (b) Any non-hazardous gas such as plant air, installed in a common trench with potable water, will be handled on a case by case basis.
  - (c) Potable water lines having a minimum horizontal separation of 1 foot clear distance from fire water and utility water.

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- 3.4 When required (as noted below) plans certified by an engineer registered in the State of Idaho will be submitted to the state for review and approval prior to construction, along with other required information. In addition, "as-constructed-plans" certified by an engineer registered in the State of Idaho, or "as-built" certification by an Idaho registered engineer, will be submitted to the State within 30 days after the completion of the project.
- 3.5 Modifications of existing drinking water systems that require plan submittal to the State include:
- (a) Extension or replacement of a water main.
  - (b) Addition or replacement of a water storage tank.
  - (c) Addition or replacement of a water treatment system, including chlorination.
  - (d) Addition of a well to the water system, or increasing the depth or diameter of an existing well.
- 3.6 Modifications to existing drinking water systems that do not require submittal of plans to the State are as follows:
- (a) Modification or addition of service connections and associated equipment. Service connection is defined as a water line that provides water from a water main and does not serve more than one building.
  - (b) Replacement or modification of well pumps.
  - (c) Maintenance, repair, replacement, and addition of valves and service connections and associated equipment, fixtures, and piping.
- 3.7 Per agreements with the State of Idaho, existing INEEL drinking water systems that do not comply with the current construction and separation distance standards, will not be required to meet such standards until the system is replaced or upgraded, unless compliance can be achieved without major modifications. Examples of modifications not considered major, are installation of a sample tap, screen, lock, valve, air vent, gauge, meter or addition of fill material. Existing construction requiring major modification is as follows:
- (a) Existing drinking water distribution systems that do not meet the current separation distances from sewer lines required by State regulation will be brought into full compliance when the distribution system is replaced or upgraded.
  - (b) Existing wells in pits will be brought above grade when the pump column is pulled.
  - (c) Wells that are not valved to pump directly to waste will be so equipped when well house piping is replaced or upgraded.

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- (d) Pumps for well house floor drains which are closer than 30 ft from the well.
- (e) Drainage ditches that are closer than 50 ft to a well. Drainage ditch modification may include but not be limited to lining or encasing the ditch to accommodate the intent of the requirement.
- (f) If any other existing construction or separation distance requirement cannot be met, without major modification, the State of Idaho will be notified and requested to approve a compliance strategy for the existing situation.

#### 0266-4. WATER AND FIREWATER MAINS

- 4.1 Underground water and fire water distribution piping 4 in. and larger shall be in accordance with AWWA or NFPA as applicable and shall be selected based on the best combination of performance, maintenance and cost. Acceptable materials include but are not limited to cement lined ductile iron conforming to AWWA C104, preferably with friction push-on seal-joints such as "Tyton", polyvinyl chloride (PVC) class 200 pipe conforming to AWWA C900 with bell and spigot friction-type, push-on joints. Acceptable fittings for the PVC pipe systems may include but are not limited to cement-lined ductile-iron. Alternate materials to be considered shall be NSF listed and UL or FM approved, and requests for use of alternate materials shall be submitted to the OC and DOE-ID for review and approval. When cathodic protection of the piping is planned or anticipated, joints shall have positive bonding to ensure continuity.
- 4.2 System control valves on the water systems shall be gate valves or gear driven butterfly valves. All valves on water supplies that eventually supply fire protection systems, except individual hydrant key valves, shall be of the indicating type (PIV), (PIVA), (OS&Y) or other UL or FM approved butterfly valves. Valves shall close clockwise and open counterclockwise. Butterfly valves shall not be used on fire pump suction lines.

#### 0266-5. WATER SUPPLY TANKS

- 5.1 Surface storage tanks shall be used in preference to elevated storage tanks. Steel storage tanks shall comply with AWWA Standard D100, Steel Tanks, Standpipes, Reservoirs, and Elevated Tanks for Water Storage, and if used for storage of fire water, NFPA 22. Surface storage tanks shall be supported on a raised earth-fill with adequate drainage. The seismic provisions of AWWA D100 are applicable to water storage tanks at the INEEL. The distribution system shall be supplied from the storage tanks by pumps discharging directly into the system. When pumps with variable speed drivers are used to supply the distribution system, a pressure relief valve shall be provided with bypass

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pipings. Pneumatic-type pressure systems shall be permitted only on approval from DOE-ID. Storage tanks shall be supplied with top vents and shall have an overflow discharge pipe that will act as an auxiliary vent. Suitable drains shall be provided.

- 5.2 Fire water, utility, process water, or irrigation systems may draw from the same water supply tank provided that:
- (a) The tanks have been adequately sized to supply domestic utility process and fire water.
  - (b) The design precludes utility or process uses from tapping into the fire water reserve capacity (e.g., utility pump suction inlet is located above the minimum reserve tank height to meet fire water demand requirements).
- 5.3 As required by the State of Idaho Regulations there shall be a minimum distance of fifty (50) ft between any potable storage reservoir and any sanitary sewers, storm sewers, standing water, or any other source of contamination.

#### 0266-6. WELLS

- 6.1 **General** All deep-well pump houses shall be of the above-ground type, having removable noncombustible roofs or other suitable means to facilitate hoisting and removal of the pump and contents.
- 6.2 Deep-well pumps shall have above-ground discharge and shall be equipped with a flow recording meter and an adequately sized air and vacuum relief valve. All pump motors shall have their bases a minimum of 12 in. above the normal ground, finished grade, or maximum flood elevation as specified in the project design criteria. All deep-well pumps shall have time delay relays included in their starting equipment. Provision for water sampling shall be provided as close to the well head as possible.
- 6.3 Piping from deep wells shall be arranged so that the well normally pumps into the supply tank(s), but can also be used to supply water distribution mains directly by means of manually operated shutoff and bypass valves.
- 6.4 **Drinking Water Wells** INEEL drinking water wells will be constructed to meet the referenced well construction standards. Specifications or scope of work documents for drinking water wells shall contain the following requirements:
- (a) Wells shall be constructed by drillers currently licensed in the State of Idaho who must maintain a copy of the drilling permit at the drilling site.
  - (b) The driller must prepare a well log and submit the log to the Department of Water Resources, upon completion of the well.
- 6.5 Chemical analysis of all underground water at the INEEL is available upon request.



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**TITLE: WATER DISTRIBUTION SYSTEMS**  
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- 6.6 Separation Distances for Drinking Water Wells** The State of Idaho requires that drinking water wells shall be located a minimum of fifty (50) ft from any potential source of contamination. As a clarification of the State of Idaho regulations no drinking water wells shall be closer to specified sources of contamination than set forth below:

- Sewer line 50 ft
  - Septic tank 100 ft
  - Sewage disposal field 100 ft
  - Sewage seepage pit 100 ft
  - Canals, streams, ditches, lakes, ponds 50 ft
- and tanks used to store non-potable substances.

**0266-7. FIREWATER SYSTEM**

- 7.1** When new firewater systems are being installed in an area where there is no existing fire or potable water system, they shall be separated from potable water systems where economically feasible. Combined systems shall comply with all NFPA requirements for firewater systems. When fire suppression water piping and potable water piping are supplied from a common source, backflow prevention devices for fire suppression systems shall be required for all new DOE-ID facilities in accordance with Idaho state law. Installation of approved backflow prevention devices shall be made at the point of separation of potable water supply piping. In order to decrease installation and maintenance cost, the separation point for combined source systems should be after entrance to the building.
- 7.2** Firewater systems, including combined systems shall be designed for a minimum 175 psig. Design of new pumping installations shall consider surge pressures caused by water hammer. Wherever practicable, water distribution systems shall be looped and valved to permit zone isolation. Lines or subsystems handling water only for fire protection and other systems where water flow is off or restricted for extended periods shall have a minimum earth cover of 6 ft to the top of pipe. If sufficient flow or other freeze protection means is provided, such as insulation above the lines, earth cover may be reduced. Alternate freeze protection methods shall be documented with calculations, where appropriate, as part of the design. Main distribution lines handling water for combined fire protection, domestic and/or plant use shall have a minimum earth cover of 5 ft.
- 7.3** Requirements for pressure and burial depth shall apply to the entire distribution system including fittings, valves, hydrants, etc.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: OIL DISTRIBUTION SYSTEMS****DATE: August 1998****SECTION: 0269****0269-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- 40 CFR 264.190, Hazardous Waste Treatment, Storage and Disposal Facilities
- 40 CFR 280, Underground Storage Tanks
- NFPA 30, Flammable and Combustible Liquids Code
- NFPA 31, Oil-Burning Equipment

**0269-2. GENERAL**

- 2.1 Systems shall comply with the appropriate NFPA codes.

**0269-3. FUEL STORAGE TANKS**

- 3.1 Fuel storage tanks shall be designed to comply with API and NFPA No. 30 and No. 31 Standards. Tanks shall be installed above ground unless otherwise directed. They shall be bermed or provided with secondary containment to isolate and contain spills as required by the above codes and standards. Permits must be obtained for tanks located below grade, and the requirements of the solid waste amendments, Section 9003, 40 CFR 264.190 and 40 CFR 280 must be met.

DOE-ID ARCHITECTURAL ENGINEERING STANDARDS	TITLE: SEWERAGE AND SEWAGE TREATMENT SYSTEMS DATE: August 1998	SECTION: 0270
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**0270-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards

**1.2 Referenced Regulations, Codes and Standards**

- Idaho Water Quality Standards and Waste Water Treatment Requirements (Idaho Code, Title 1, Chapter 2)
- Recommended Standards for Wastewater Facilities, Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers

**0270-2. GENERAL**

- 2.1 Design to conform to Idaho Water Quality Standards and Waste Treatment Regulations (Idaho Code, Title 1, Chapter 2). The Idaho Waste Treatment Regulations reference the Recommended Standards for Wastewater Facilities for most requirements. See IDAPA 16.01.02402. See Section 0300 for concrete requirements for sewage treatment structures.
- 2.2 Sewage treatment plants shall be located downstream (groundwater flow) from the production wells. Groundwater flow at the INEEL is generally to the south or southwest.
- 2.3 Normally, all flow from sewage treatment plants must be monitored for total flow.
- 2.4 All treatment plant inflow shall be provided with a continuous inline pH meter to warn of potential upset conditions.
- 2.5 Sewer main cover shall be sufficient to protect against freezing. Where available cover is insufficient to protect against freezing, insulation may be used.
- 2.6 Standard plans for sewer manholes and covers are shown on the appropriate drawing listed in Appendix D.

**0270-3. TREATMENT REQUIREMENTS (PERMANENT INSTALLATIONS)**

- 3.1 Installations Serving up to 500 People If precast concrete septic tanks, are used the minimum size shall be 1000 gallons (sized for a minimum of 48 hours retention). A maximum of three such tanks installed in series is acceptable, provided the total volume of the three tanks is equal to or larger than that required for a single tank. Septic tanks shall be accessible for servicing and maintenance.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: SEWERAGE AND SEWAGE TREATMENT  
SYSTEMS****DATE: August 1998****SECTION: 0270**

- 3.2 **Installation Serving Over 500 People** As a minimum, primary and secondary treatment is to be provided. Should trickling filters or intermediate sand filters be used, they should be designed with weather enclosures for severe winter conditions. Activated sludge-type treatment facilities are not recommended because of the large fluctuation in sewage flows normally encountered.
- 3.3 **Effluent from Installations in Areas Having Impervious Soils** Lagoons (oxidation ponds) may be considered for use in areas having impervious soils. Approval for their use on any site location must be obtained from DOE-ID.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS**TITLE: CONCRETE  
DATE: January 1997

SECTION: 0300

**0300-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- Ⓒ ACI 318, Building Code Requirements for Reinforced Concrete

**1.2 Referenced Codes and Standards**

- Ⓒ ACI 349, Code Requirements for Nuclear Safety Related Concrete Structures
- Ⓒ ACI 350, Environmental Engineering Concrete Structures
- Ⓒ ACI Manual of Concrete Practice as applicable to the specific project
- Ⓒ AASHTO, Standard Specifications for Highway Bridges

**0300-2. GENERAL**

- 2.1 Buildings and Other Structures** Concrete materials, design, and construction for buildings and other structures shall comply with ACI 318 unless specified otherwise herein or in the specific project design criteria.
- 2.2 Highway and Railway Structures** Concrete materials, design, and construction for buildings and other structures shall comply with AASHTO Standards unless specified otherwise in the specific project design criteria.
- 2.3 Sanitary Engineering Structures** Concrete materials, design, and constructions for buildings and other structures shall comply with ACI 318 and ACI 350 unless specified otherwise in the specific project design criteria. If there are conflicts between the two ACI codes, ACI 350 will generally govern.
- 2.4 Nuclear Safety Related Structures** Concrete materials, design, and construction for buildings and other structures shall comply with ACI 349 unless specified otherwise in the specific project design criteria.

**0300-3. CONCRETE QUALITY**

- 3.1** Concrete quality shall generally conform to the requirements of ACI 318. The AE shall use the ACI Manual of Concrete Practice and the AASHTO Standards as appropriate to design, and regarding construction requirements for concrete structures.

<b>DOE-ID ARCHITECTURAL ENGINEERING STANDARDS</b>	<b>TITLE:     STRUCTURAL STEEL</b> <b>DATE:      January 1997</b>	<b>SECTION: 0512</b>
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**0512-1.   CODES AND STANDARDS****1.1   Applicable Codes and Standards**

C     AES 0100-1, Codes and Standards

**1.2   Referenced Codes and Standards**

C     AASHTO, Standard Specifications for Highway Bridges

C     AISC, Specification for Structural Steel Buildings, Allowable Stress Design, Plastic Design

C     AISC, Load and Resistance Factor Design Specification for Structural Steel Buildings

C     ANSI/AISC N690, Specification for the Design, Fabrication, and Erection of Steel Safety Related Structures for Nuclear Facilities

C     AISI, Specification for the Design of Cold-Formed Steel Structural Members

C     ASME Section III, Division 1, Article NF

C     MBMA, Metal Building Systems Manual

C     SDI, Design Manual for Composite Decks, Form Decks and Roof Decks

C     SDI, Diaphragm Design Manual

C     SJI, Standard Specification for Open Web Steel Joists.

**0512-2.   STRUCTURAL STEEL, STEEL JOIST AND STEEL DECKING**

**2.1   Buildings and Other Structures** Design for all structural steel work shall conform to the latest edition of the AISC Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design or Load and Resistance Factor Design Specification for Structural Steel Buildings and other applicable codes listed herein except that the allowable compression stress for austenitic stainless steel and nickel-based alloy structures shall be determined per ANSI/AISC N690; ASME Section III, Division 1, Article NF-3322 or other applicable national consensus codes that cover the design of stainless structures. Generally, structural steel shall conform to ASTM A-36. Bolted connections shall generally be made with high strength steel bolts meeting ASTM A-325. Steel joists shall conform to the latest edition of the Steel Joist Institute standard specifications. Steel decking shall be designed in accordance the referenced Steel Deck Institute (SDI) manuals.

Pre-engineered buildings shall comply with the MBMA Metal Building Systems Manual.

**2.2   Nuclear Safety Related Structures** Design for all structural steel work shall conform to AISC N690 and other applicable codes referenced herein.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE:** STRUCTURAL STEEL  
**DATE:** January 1997**SECTION:** 0512

- 2.3 Steel Highway and Railway Structures** Design for all structural steel work shall conform to the AASHTO Standard Specifications.
- 2.4 Light-Gage Steel** Light gage steel shall comply with AISI Specifications for the Design of Cold-Formed Steel Structural Members.

DOE-ID ARCHITECTURAL ENGINEERING STANDARDS	TITLE: WELDING DATE: January 1997	SECTION: 0532
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**0532-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

C AES 0100-1, Codes and Standards

**1.2 Referenced Codes and Standards**

C AWS, American Welding Society Welding Codes

C INEL Welding Manual

**0532-2. GENERAL**

**2.1** The AE shall designate in the specification and/or on the drawings the applicable welding fabrication code requirements (i.e., ANSI B31.1, ANSI B31.3, AWS D1.1, ASME Section VIII, etc.). The INEL Welding Manual has been developed outlining approved welding procedures and production controls. In conjunction with this, a site-wide system to monitor the qualification status of individual welders has been established. Use of these approved procedures and qualified welders, where applicable, constitutes compliance with national consensus codes (ANSI/ASME B31.1, ANSI/ASME B31.3, etc.). The applicable code or standard shall be designated for each welding application. All welding performed at the INEL (on-site) shall meet the requirements of the INEL Welding Manual.

**2.2 ASME Code Applications** ASME Code Applications include: (1) piping and equipment which involves pressure boundary welds and integral attachments (attachments welded to pressure boundary), but does not include non-integral attachments and supports; (2) Pressure vessels and tanks with the exception of containment devices (i.e. drip pans and cell liners).

**2.3 Other Code Applications** All other applications shall be governed by the AWS Codes or other applicable codes. The INEL Welding Manual provides structural welding procedures for aluminum, carbon steels, low alloy steels, nickel based alloys and austenitic stainless steels. Other materials can be qualified as necessary.

**0532-3. ON-SITE WELDING**

**3.1** The AE shall designate in the specification the applicable welding procedure specifications from the INEL Welding Manual. Where a project's welding applications are extensive and where approved by the OC's PM, an AE may elect to specify the acceptable welding process for each application identified in the INEL Welding Manual in lieu of the specific INEL welding procedure specifications.

**0532-4. OFF-SITE WELDING**

**4.1** The AE shall designate in the specification the applicable welding fabrication code requirements, appropriate welding processes and shall designate submittal requirements (i.e., weld standards, welding procedures, welding procedure qualification records, corrosion samples, and/or welding personnel qualification records) that may be deemed necessary to



**DOE-ID ARCHITECTURAL  
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ensure the required level of quality.

- 4.2** Qualification of welders and welding procedures shall be performed in accordance with the applicable fabrication code. In general, these fabrication codes reference ASME IX or an AWS code; however, the fabrication code may have additional requirements that must be met.
- 4.3** The AE shall also provide in the specification that the Construction Subcontractor may, at his option and with the Operating Contractor's approval, use the INEL Welding Manual and INEL Weld Procedure Specifications for offsite welding. When using the INEL Welding Procedure Specification off site all welders shall be qualified at the INEL Welder Test Facility.
- 4.4** The AE shall identify acceptable off-site welding processes.

**0532-5. NONDESTRUCTIVE EXAMINATION REQUIREMENTS**

- 5.1** The AE shall specify welding inspection and test requirements that are appropriate for the type of service, applicable code, and the quality of welds required.
- 5.2** The AE shall clearly identify in the specification and/or the drawings any weld inspection and test requirements, including:
  - (a)** Applicable examination code (ANSI B31.3, etc.).
  - (b)** Type of weld inspection required (visual, liquid penetrant, radiographic, etc.), and, where necessary, the percentage of welds to be examined and the weld layer or layers to be examined.
  - (c)** Who will perform the onsite and offsite inspection.
  - (d)** Specific acceptance/rejection criteria.
  - (e)** Submittal requirements for Welding Inspection.
  - (f)** Required material certification tests for weld filler materials.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE:** INSULATION, SEALANTS, AND JOINTS  
**DATE:** January 1997  
**SECTION:** 0720**0720-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C 10 CFR 435, Energy Conservation

**1.2 Referenced Codes and Standards**

- C NAA-SR-10100, Conventional Buildings for Reactor Containment

**0720-2. BUILDING INSULATION**

- 2.1 Commercial use buildings shall comply with the insulation guidelines of 10 CFR 435. Minimum insulation requirements for heated buildings are in 0112-7. Insulation materials shall comply with UBC requirements as a minimum. See Section 0750 for additional requirements for roofing insulation.

**0720-3. BUILDING SEALING**

- 3.1 **General** Building design shall provide sealing as required by the HVAC system, energy conservation requirements and ventilation needs. See 0112, 1550 and 1551 for additional guidance. Sealing materials shall comply with UBC requirements.
- 3.2 **Sealing for Radioactive or Hazardous Material Control** Building design for radioactive or hazardous material contamination control shall consider both material options and construction techniques that minimize air infiltrations between negative pressure building perimeters and the outside environment. Infiltration between differing internal pressure zones shall also be minimized to the extent consistent with design allowances and economic considerations. Representative leak test data is found in NAA-SR-10100.
- 3.3 The methods outlined in NAA-SR-10100 should be considered in optimizing building design so as to minimize infiltrations. Specifically, the design shall address the following:
  - (a) Additional field caulking requirements for manufactured external siding systems. Treatment of wall to roof, wall to floor, corner, wall to girt, and wall to ceiling joints.
  - (b) Sealing of interzone electrical conduits with a pliable and removable sealant.
  - (c) Proper trapping of interzone drains or atmospheric piping systems.
  - (d) Capping of hollow doors and proper alignment of all doors with weatherstripping, sealing, and closure hardware, plus adequately designed adjustable thresholds.
  - (e) Pressure relief hardware for doors crossing a differential pressure of 0.5 in. wg or greater, preferably in the form of a shutter.

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- (f) Door (and other) sealing systems oriented to benefit from induced forces of pressure differentials (i.e., pressure acting to seal).
- (g) Sealing of all pressure boundary penetrations of the building perimeter.
- (h) Sealing of pre-engineered metal buildings.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: ROOFING SYSTEMS  
DATE: August 1998****SECTION: 0750****0750-1. CODES AND STANDARDS****1.1 Applicable Codes and Standard**

- AES 0100-1, Codes and Standards

**1.2 Referenced Codes and Standards**

- ASCE 7, Minimum Design Loads for Buildings and Other Structures
- FM 1-28, Wind Loads to Roof Systems and Roof Deck Securement
- FM 1-28S, Wind Uplift Pressures on Roofs
- FM Approval Guide (or other equivalent national standard)

**1.3 Other References**

- AFM 91-36 Built-Up Roof Management Program with enclosed BUR Repair/Replacement Guide Specifications
- ARMA Residential Asphalt Roofing Manual
- ARMA Guide to Preparing Built-Up Roofing (BUR) Specifications, Recommended Performance Criteria for Roofing Membranes using Polymer Modified Bituminous Products
- MBMA - various publications.
- NRCA Roofing and Waterproofing Manual, Handbook of Accepted Roofing Knowledge
- NRCA Steep Roofing Manual
- SMACNA - Architectural Sheet Metal Manual
- SPRI A Professionals Guide to Specifications, Parts I-IV Wind Design Guide for Ballasted Single Ply Roofing Systems, Wind Design Guide for Mechanically Attached Single Ply Roofing Systems, Wind Design Guide for Fully Adhered Single Ply Roofing Systems

**0750-2. ROOFS AND ROOFING REPAIR**

- 2.1** General Roof systems shall be designed to ensure that the dew point does not occur within the roof system. A vapor barrier shall be placed so as to prevent the formation of condensation in the roof system. Dew points shall be calculated for temperatures of 70°F and -5°F with relative humidity of 55%.
- 2.2** All roof systems shall be designed to have sufficient positive drainage to satisfy the requirements of the particular roof system selected. If possible, new or replaced roof systems selected shall be warranted by the roof manufacturer for workmanship, material, wind resistance and against leakage for 20 years. A minimum 10 year manufacturers warranty on both workmanship and material is required for any new or replaced roof system. Patch work shall normally include a 2 or 3 year installer's warranty. The design engineer shall note that roof warranties are invalidated if standing

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water is present for more than 48 hours and if any other of the warranty requirements are violated.

- 2.3 **Wind Resistance** All roof systems shall be designed to comply with FM Class 1-60 or Class 1-90 Windstorm Resistance criteria or their equivalent. Wind pressures on roofing shall be calculated based on the criteria in ASCE 7 or FM 1-28S. If the calculated wind uplift pressure is less than 30 psf, FM Class 1-60 securement or its equivalent shall be used. If the calculated wind uplift pressure is between 30 and 45 psf, FM Class 1-90 securement or its equivalent shall be used. If the calculated wind uplift pressure is in excess of 45 psf special roofing systems are required.

### 0750-3. ROOF TILES

- 3.1 **Shingles** Fiberglass mat reinforced type shingles shall be used if this type of roof tile treatment is selected. Shingles shall be of a minimum weight of 225 lbs per square. Shingles shall not be applied to roofs with slope less than 3 in 12. Shingles shall have a Class A fire resistance.
- 3.2 **Clay, Slate, and Concrete Tiles** These engineered roofing treatments have a very high initial cost, and the design professional is required to perform a life cycle cost analysis justification prior to selection of this type of roof treatment. Pre-finish metal tile shall only be applied to steep roofs. Other constraints for use of these types of roof systems are defined in the NRCA Publication "Steep Roofing Manual".

### 0750-4. MEMBRANE ROOFING

- 4.1 **Asphalt BUR** Asphalt BUR's shall be designed to have a minimum finished slope of 3/8" per ft. including saddles and crickets. If it is necessary to reroof a building with an existing roof slope of less than 1/4" per ft, tapered insulation should be considered to increase the roof slope. Only Type VI asphalt impregnated glass fiber mat felt shall be specified for membrane plies. A vented base sheet shall be required. BUR aggregate surfacing shall be nominal 3/8" diameter with no fines and shall comply with ASTM D-1863. A minimum of 70 lbs per 100 square feet of asphalt flood coat is required
- 4.2 **Single-Ply Roofing** All single-ply roofing shall comply with guidelines set forth by the SPRI and the NRCA. In general, all single ply elastomeric/plastomeric roof systems shall be designed with a minimum slope of 1/4" per ft. Construction details and installation shall be in accordance with SPRI and NRCA. Use reinforced membrane on mechanically attached systems. Use unreinforced membrane on adhered systems. Use reinforcement mat over unreinforced membranes on ballasted systems.

- (a) EPDM Special precautions shall be taken to protect this roofing system

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from ultra violet radiation and chemical degradation. Only manufacturer's standard EPDM material shall be considered for use as flashing. When choosing an attachment or ballast system for this material, the design engineer shall consider the effects of wind and thermal expansion and contraction. Large ballast or pavers are required for a loose laid system. Mechanical attachment patterns shall be designed for worst case wind conditions. Extra fasteners should be considered to account for the deterioration of the roof substrate. A minimum 60 mil EPDM membrane is required.

- (b) **PVC** Like EPDM, PVC is subject to chemical and UV deterioration. This material is not recommended for use as a roofing material at the INEEL.
- (c) **Hypalon** Hypalon is a brand name of Dupont Corporation. The single ply hyposulfonated, nylon reinforced membrane has good resistance to UV and chemical attack. This single ply membrane is subject to the same attachment constraints as EPDM and PVC.

4.3 **Modified Bitumen Roofing** All modified bitumen membranes used at INEEL shall have a minimum total ply thickness of 240 mils and shall be reinforced with at least one mat of fiberglass and 1 mat of polyester. Three reinforcing plies are preferred.

4.4 The torchdown method is not allowed at the INEEL. For the mopped down method, Type III asphalt shall be required if the roof slope is less than or equal to 1/2" and Type IV asphalt for greater slopes. Mopped down modified bitumen shall be applied in accordance with NRCA recommendations.

4.5 **Fire Protection Requirements for Built-Up Roof Systems on Metal Decking** See Factory Mutual Data Sheet 1-28, the FM Approval Guide or equivalent for acceptable materials and construction methods. For fire protection purposes the two classes are described below. Only Class 1 roofing is acceptable at INEEL facilities.

- (a) **Class 1** Includes construction with only minimal asphalt or other readily combustible material between the insulation and the metal deck. The vapor barrier is noncombustible.
- (b) **Class 2** Includes construction using larger quantities of asphalt for adhesion or wind resistance and/or asphalt coated insulation between the insulation and the metal deck. This is considered a combustible roof and is not acceptable at DOE-ID facilities.

## 0750-5. SHEET METAL ROOF SYSTEMS

- 5.1 In general this designation refers to standing seam sheet metal roofs. Many of these roof systems are the product of a pre-engineered metal building manufacturer. For this type of roof system adequate drainage shall be provided. In no case shall the drainage slope be less than 1/2" per ft. The

designer shall take special care to detail wall to roof and roof penetration details to ensure a water tight fit and resistance to ice entrapment and ice dam formation. An overhang of 6" is required at the wall. The roof shall be designed with a concealed fastener system. A 20 year warranty shall be required against finish and material degradation and leakage.

#### **0750-6. NONSTANDARD ROOF SYSTEMS**

- 6.1 Inverted Membrane Roof Systems are difficult to inspect and maintain. However, they may be considered where considerable foot traffic or other high wear condition is expected. These roof systems are composed of a membrane overlaid by closed cell extruded styrofoam insulation. The system shall be ballasted with nominal 1-1/2" rounded aggregate or pavers. Membranes specified shall be either 4 plies of Type IV glass mat reinforced felt set in intermittent layers of asphalt, EPDM, Hypalan, or modified bitumen. Dow Chemical "Styrofoam Brand Insulation" reference manual describes inverted membrane roofing systems in detail.

#### **0750-7. FALL PROTECTION**

- 7.1 Permanent fall protection anchors, handrails or other fall protection devices should be considered for all roofs for which foot traffic near the edge is probable. All fall protection shall comply with the 29 CFR 1910 (OSHA) requirements. Designs should consider the need for fall protection during initial construction per the requirements of 29 CFR 1926.

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**0800-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C ANSI A156 series, Door and Window Hardware

**1.2 Referenced Codes and Standards**

- C NFPA 80, Fire Doors and Windows
- C NFPA 101, Life Safety Code
- C ISDSI 102, Installation Standard for Insulated Steel Door Systems
- C SDI 100, Standard Steel Doors and Frames
- C SDI 108, Selection and Usage Guide for Standard Steel Doors

**0800-2. DOORS AND HARDWARE**

**2.1** Hollow steel doors and frames shall comply with SDI 100 and SDI 108. Insulated steel door systems shall comply with ISDSI 102. Non-security doors and door hardware shall conform to the following:

- (a) All keyed lock sets installed at the INEL must be suitable for incorporation in the DOE-ID Security lock and key system. The lock sets must be capable of accepting and operating with a 7-pin Best Universal Lock Co. No. 1E74 cylinder with No. 1EC4 cam, which will be Government furnished and installed following installation of the lock set.
- (b) Unless otherwise directed, lock or latch sets shall be Federal Specifications Series 160 plain for cylinder type, and Federal Specifications Series 86 for mortise type.
- (c) Glass in glazed doors shall be wire-reinforced safety glass and shall not be removable from outside the door. Structural members, such as steel channels embedded in wall openings, shall not substitute as door frames. All doors shall be provided with fitted frames which are anchored to, but separated from, building structural members. Paired or double doors containing lock or latch sets, where no mullion is used between the doors, shall be provided with a door coordinator to control the closing sequence, and the door containing the striker plate shall be rendered inactive by use of a cremone bolt or a top and bottom panic bolt in the case of doors requiring panic devices for fire exit.
- (d) Bracket-mounted closers which obstruct the door opening shall not be used.

**2.2 Fire Doors** Fire doors and frames shall meet the requirements of NFPA 80 and NFPA 101. Magnetic door holders or building fire panels, shall be provided for those fire doors which are required to be held open.



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- (a) Doors located in fire barriers shall be rated assemblies as required by the UBC.
- (b) Where strict compliance is not possible for existing facilities, the noncompliance shall be documented as an exception, or an equivalency study and additional protective systems, administrative controls, and personnel limits shall be provided.

**Exception:** Unapproved hardware for security purposes may be installed on fire doors and frames with the approval of the OC Facility FPE.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE:** CRANES AND HOISTS  
**DATE:** September 1997**SECTION:** 1460**1460-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

Ⓒ AES 0100-1, Codes and Standards

**1.2 Referenced Codes and Standards**

Ⓒ ASME B-30.2, Overhead and Gantry Cranes

Ⓒ ANSI B30.16, Overhead Hoists (Underhung)

Ⓒ ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes

Ⓒ CMAA 70, Specification for Electric Overhead Traveling Cranes

Ⓒ CMAA 74, Specification for Top Running and Under Running Single Girder Electric Overhead Traveling Cranes

Ⓒ DOE-STD-1090 Hoisting and Rigging

**1460-2. GENERAL**

- 2.1** Specifications for cranes and hoists shall clearly state all design, inspection, and performance requirements, such as rated capacity, duty cycle, seismic requirements, design life, design performance standards, special features, hoist and travel speeds, lift limits, electrical characteristics, etc. The specification shall also clearly state that the cranes shall be load tested at 125% of the rated load.
- 2.2** Cranes and hoists for nuclear service where critical lifts are involved, shall meet the requirements of the DOE-STD-1090, and ASME NOG-1. Critical lifts are designated in DOE-STD-1090. Additional lifts may be designated as high consequence or special high consequence by DOE-ID and shall be identified in the project design criteria.
- 2.3** Structural elements of cranes, hoists, and lifting fixtures shall be designed to meet the stress limits for each of the load combinations specified in DOE Hoisting and Rigging Manual references.
- 2.4** All cranes and hoists shall have seismic restraints and shall have designated parking areas if required for safety reasons. (The parking areas shall not be over personal organized space or over vital or hazardous equipment.)

**1460-3. OVERHEAD BRIDGE CRANES**

- 3.1** Overhead traveling bridge cranes for "general use" shall meet, 29 CFR 1910, Subpart N, DOE-STD-1090, ASME B-30.2 and CMAA 70 with the following modifications and additions:

<b>DOE-ID ARCHITECTURAL ENGINEERING STANDARDS</b>	<b>TITLE: CRANES AND HOISTS</b> <b>DATE: September 1997</b>	<b>SECTION: 1460</b>
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- (a) For cranes of 25-ton capacity and larger, all welds on the trolley and hoist assembly shall be stress-relieved, except where manufacturing methods and procedures are specifically tailored to minimize stresses in the as-welded condition.
- (b) Cast iron shall not be used for any structural members of mechanical load-bearing components.
- (c) All torsional load transfer couplings in the hoist and trolley assembly shall be locked to their respective shafts by positive means such as keys, splines, pins, etc. Taper lock or friction-type coupling connections will not be permitted.
- (d) All open or concealed power transfer shafts in the hoist and trolley assembly shall be so designed as to minimize localized stressing or stress concentration regardless of shaft application (gear boxes, motors, drive trains, etc.). Crane specifications shall state the maximum allowable stress concentration values for power shafting in accordance with the latest AGMA Standard.
- (e) The hoist cables shall have a safety factor of 5, based on the nominal breaking strength.
- (f) All load hooks of 5-ton capacity or less shall be equipped with safety latches, preferably of the swing gate type. Load hooks greater than 5-ton capacity should be equipped with safety latches if compatible with operating requirements.
- (g) Overhead traveling cranes operated from a cab shall be equipped with means of a safe emergency escape regardless of its position along the runway.
- (h) Hazardous features of the crane shall be safety color coded in accordance with 29 CFR 1910.144 and 29 CFR 1910.145(F) Appendix A.

#### **1460-4. TOP RUNNING AND UNDER RUNNING SINGLE GIRDER ELECTRIC OVERHEAD TRAVELING CRANES**

- 4.1 Top running and under running single girder electric overhead traveling cranes shall comply with OSHA standards, 29 CFR 1910, Subpart N, DOE-STD-1090, and CMAA Specification No. 74.

#### **1460-5. HOISTS**

- 5.1 Hoists shall comply with OSHA standards, 29 CFR 1910, Subpart N, DOE-STD-1090, and ANSI B30.16.

#### **1460-6. SPECIALTY ITEMS**

- 6.1 Specialty items such as manipulators, fuel casks, remotely operated mechanisms, etc. shall be designed to satisfy project design criteria and functional and operational requirements. In all designs, the maximum use of standard commercial parts and components is essential.

#### **1460-7. POWER AND CONTROLS**

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: CRANES AND HOISTS**  
**DATE: September 1997****SECTION: 1460**

- 7.1** Electrically powered bridge mounted cranes and/or other traveling weight-lifting equipment shall be provided with enclosed-type current conductors and collectors or festoon type cabling. Runway cranes shall be grounded by means of a conductor routed with the power supply conductors as well as via the wheels and track. Use of shielded cable shall be considered. Rails shall be bonded to the building grounding grid.
- 7.2** Dynamometers or load cells shall be considered for cranes involved in critical lifts as defined in the DOE-STD-1090.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: MECHANICAL DESIGN**  
**DATE: September 1997****SECTION: 1500****1500-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 0512, Structural Steel
- C ASME Boiler and Pressure Vessel Codes
- C IAPMO\ICBO, Uniform Mechanical Code
- C ISA Standards
- C TIMA Standards

**1500-2. GENERAL**

- 2.1 Design Elevation** All mechanical equipment shall be capable of meeting specified performance at an elevation of 5000 ft above sea level or as otherwise designated.
- 2.2** Equipment shall be the manufacturers' standard product wherever possible. Like items shall be provided by the same manufacturer. Requirements for sole source or custom designed mechanical items shall be brought to the attention of the OC.
- 2.3 Locking Devices** As required by 29 CFR 1910.147, whenever applicable machines, equipment or systems are replaced, or undergo a major modification, or upgrade, the means to accept a lockout device on energy isolating devices shall be included as part of the replacement. Machines, equipment or systems that have lockout devices as standard accessories shall be specified with those devices.

<b>DOE-ID ARCHITECTURAL ENGINEERING STANDARDS</b>	<b>TITLE: FIRE PROTECTION SYSTEMS</b>	
	<b>DATE: December 1998</b>	<b>SECTION: 1530</b>

## 1530-1. CODES AND STANDARDS

### 1.1 Applicable Codes and Standards

- AES 0100-1, Codes and Standards
- AES 0185-1.1, Applicable Codes and Standards
- NFPA 13, Installation of Sprinkler Systems
- NFPA 12, Standard on Carbon Dioxide Extinguishing Systems
- NFPA 101, Life Safety Code

### 1.2 Referenced Codes and Standards

- NFPA 10, Portable Fire Extinguishers
- Cross Connection Control Manual, Accepted Procedure and Practice - Pacific Northwest Section of AWWA.

## 1530-2. DEFINITIONS

### 2.1 Underground Fire Protection Piping Systems

- (a) **Primary Facility Distribution Loops** Primary loops consist of large pipes with relatively wide spacing. This portion of the piping distribution system conveys large quantities of water to various points of the fire water distribution system for local distribution. Primary facility distribution loops at DOE-ID shall be no less than 10 in. in diameter.
- (b) **Secondary Facility Distribution Loops** Secondary distribution loops form a network of piping of intermediate size. This portion of the piping distribution system reinforces the distribution grid within the various panels of the primary systems or loops and aid in concentrating required fire flow at any point. Secondary facility distribution loops at DOE-ID shall be no less than 8 in. in diameter.
- (c) **Building Lead-ins** This term is used at DOE-ID to indicate the fire main between the source (normally a looped main) and the base of the riser for water-based fire protection systems. Building lead-ins shall be no less than 6 in. in diameter.
- (d) **Cross-Connection Control Devices** This term is used for approved backflow prevention devices used to isolate potable water supplies from other systems such as fire suppression systems.

### 2.2 CO<sub>2</sub> Fire Extinguishing Systems

- (a) **High Pressure** Indicates that the carbon dioxide is stored in pressure containers at ambient temperatures. At 70°F (21°C), the pressure in this type of storage is 850 psi (5860 kPa).

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- (b) **Local Application System** A system consisting of a supply of carbon dioxide arranged to discharge directly on the burning material.
- (c) **Low Pressure** Indicates that the carbon dioxide is stored in pressure containers at a controlled low temperature of 0°F (-18°C). At this temperature the pressure in this type of storage is 300 psi (2068 kPa).
- (d) **Total Flooding System** A system consisting of a supply of carbon dioxide arranged to discharge into, and fill to the proper concentration, an enclosed space or enclosure around the hazard.

### 1530-3. GENERAL

- 3.1 **Automatic Fire Suppression Systems** Built-in automatic fire suppression systems shall be provided in all new construction over 5,000 sq. ft, unless otherwise approved by the OC Facility FPE, with concurrence by the DOE-ID AHJ. Special hazards may require special suppression systems (e.g., gaseous or dry chemical systems), which shall be designed and installed in accordance with the applicable NFPA or "Improved Risk" Standards. These systems shall be installed only where specified and approved by the OC Facility FPE.
- 3.2 Automatic wet pipe sprinkler systems are preferred. Dry pipe, deluge, foam, and preaction systems are more complex; therefore, they shall only be used as alternates when necessary because of cold temperatures or special protection needs as determined by the OC Facility FPE. Sprinkler systems shall be designed and installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems," including Appendix A.
- 3.3 Approved backflow preventers are required to isolate fire suppression systems from potable water supplies. See the Cross Connection Control Manual.
- 3.4 CO<sub>2</sub> system shall only be used in specific cases where the use of other fire protection agents (ie. Water, FM 200, FE 13, Inergen, etc) are not practical as determined by the OC Facility FPE. Systems shall be designed and installed in accordance with NFPA 12 including Appendices A and B, and this section.
- 3.5 When CO<sub>2</sub> protection is installed in a facility, it shall only be used in a local application method unless otherwise approved by the DOE-ID AHJ. Total flooding systems shall not be used in normally occupied areas. Facilities shall comply with NFPA 101 whenever CO<sub>2</sub> protection is installed.

### 1530-4. SEISMIC ZONES

- 4.1 Seismic activity must be considered in all fire protection system designs at DOE-ID facilities.
  - (a) Sprinkler systems must be installed in accordance with seismic criteria in NFPA 13, and fire protection-related electrical equipment and panels must be installed in accordance with seismic criteria contained in the NEC, NFPA 70. NFPA 13 seismic criteria is considered for DOE-ID facilities to

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meet or exceed UBC requirements, except as specified by the DOE-ID AHJ.

- (b) CO<sub>2</sub> system piping must be installed per ASME B 31.1.
- (c) Fire protection-related electrical equipment and panels must be installed in accordance with seismic criteria contained in the NEC, NFPA 70.

## **1530-5. SPRINKLER SYSTEMS**

- 5.1 Sprinkler system parameters shall be determined using the methods discussed in the paragraphs below. Standard sprinkler system design parameters for DOE-ID include a minimum working pressure of 175 psi for hydrants, underground mains, piping, fittings, and hose station drain connections and control valves. Fire pumps shall be rated for a minimum of 125 psi at rated flow capacity.
- 5.2 When sprinkler protection is installed in a new facility, concealed spaces, such as those above suspended ceilings, shall be sprinkled unless otherwise approved by the DOE-ID AHJ. Protection requirements for spaces below raised floors shall be determined by the OC Cognizant FPE, subject to concurrence by the DOE-ID AHJ.
- 5.3 **Occupancy Hazard Classification (Sprinkler Protection)**
  - (a) NFPA 13 shall be used to determine the Occupancy Hazard Classification for sprinkler protection requirements for any facility. DOE-ID production related facilities shall be classified as Ordinary Hazard Group 2 as a minimum. Other facilities shall be designed as Ordinary Hazard Group 1 as a minimum.
- 5.4 **Water Demands for Sprinkler Systems**
  - (a) **Schedule-Designed Sprinkler Systems** Pipe schedule designs shall be used only where approved by the DOE-ID AHJ.
  - (b) **Hydraulically Designed Sprinkler Systems** New sprinkler system designs or additions or modifications to existing system designs at DOE-ID facilities shall be hydraulically designed.
  - (c) **Fire Hydrant Demand** Refer to Section 1530-15 for the minimum fire hydrant demand for new and existing buildings with fire sprinkler systems. For non-sprinklered buildings, the minimum demand shall be determined in accordance with Appendix 3-A of the UFC.
- 5.5 **Cooling Spray Systems** Cooling spray systems should operate automatically upon abnormal heat rise indicated by detectors in the exhaust ducts feeding the cool chamber inlet. A manually operated valve actuating the spray system should also be provided as a backup. If a drain system is installed to prevent accumulation of liquid in the plenum, the collection tanks shall be of a critically safe configuration where a criticality potential exists and drains shall



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be routed to the service waste or other contaminated drain system.

- 5.6 **Water Supply Curve** A safety factor shall be included in the design of fire suppression systems. The safety factor shall be applied to the residual water supply pressure by reducing the residual pressure 10% from the actual water flow tests. Data from the water flow test shall have been taken within twelve months at the time design commences.
- 5.7 **Sprinkler Piping Design Area** Fire protection systems shall follow NFPA 13 to establish minimum design areas. The minimum design area for fire protection systems should be 2,500 sq. ft. unless a smaller design area is considered acceptable by the OC Facility FPE. In no case shall the minimum design be less than 1,500 sq. ft. The design densities shall be supplied by the OC Facility FPE via the Design Criteria or Scope of Work. If the design densities have not been stated, it is the responsibility of the design agency to request this information.
- 5.8 **Sprinkler Piping Water Flow Velocity** The maximum water flow velocity in sprinkler piping systems shall not exceed 32 ft/sec, except as limited by Factory Mutual for specific installation. Factory Mutual data sheet 2-8N specifies a maximum of 20 ft/sec for branch lines that are 2 inch diameter pipe and smaller on gridded systems.
- 5.9 **Hose Stream Allowances** A minimum of 500 gpm hose stream allowance shall be included in the design of all sprinkler pipe systems. There are possibilities for the need of 1,000 gpm allowances when dictated by the OC OC Facility FPE or his representative.
- 5.10 **Schedule 10 Piping** Schedule 10 piping is allowed for wet pipe sprinkler systems located in office areas only. This piping shall be UL listed or FM approved, or comply with ASTM A-795. The installation of Schedule 10 piping shall be limited to bulk and cross mains of 2-1/2-in. diameter and larger. All branch lines shall remain as Schedule 40 pipe. Threadable Schedule 10 piping, cut grooving, and plain end fittings are not acceptable for use in sprinkler piping design and installations.
- 5.11 **Flow Switch Risers** Flow switch riser assemblies are allowed for use in wet pipe sprinkler systems with concurrence of the OC Facility FPE. These assemblies shall be UL listed and FM approved, and shall be similar to Central Sprinkler Company's Model 90 "SHOTGUN" riser, or approved equal.

## 1530-6. CO2 SUPPRESSION SYSTEMS

- 6.1 **Application Systems** Local and flooding application systems shall be either high or low pressure systems using the following components in all designs unless specific justification is supplied by the OC Facility FPE.
- Time Delay - either pneumatic or mechanical
  - Oderizer

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- CO<sub>2</sub> operated alarm
- Lockout device(s)
- Relief valves

- 6.2 **CO<sub>2</sub> Storage Location** Areas used for the storage of CO<sub>2</sub> tanks shall be located as close to the hazard being protected as possible and in a protected space if practicable. No CO<sub>2</sub> storage shall be allowed below grade. If low pressure storage tanks are located on the building exterior they shall be equipped with cold weather packages that will allow for heating of the tank contents and associated piping and gauges.
- 6.3 **CO<sub>2</sub> Storage** The amount of CO<sub>2</sub> required in storage shall provide a minimum safety factor of 1.2 and provide for a minimum of 2 separate discharges of the largest hazard area. If separate hazard areas are within 25 ft. of each other or if the fire hazard analysis shows that a fire can be reasonable expected to activate more than one zone of the CO<sub>2</sub> system, the total amount of CO<sub>2</sub> required for storage shall be based upon the combined operation of the adjacent zones.
- 6.4 **O<sub>2</sub> Warning Signs** Signs shall be provided in accordance with NFPA 12 and shall be specified as part of any new installation.
- 6.5 **Lockout Devices** Lockout devices shall consist of a lockable ball or gate valve located on the discharge charge header prior to the hazard being protected. No listed or approved valve currently exists for the high pressure systems. Thus special consideration must be taken in selecting this valve. Supervision of the valve position shall be installed and report back to the CO<sub>2</sub> system control panel.
- 6.6 **Relief Valves** Relief valves shall be installed between all lockout devices and the storage unit. The relief valves shall be designed to vent to the out of doors and away from all building openings or air intakes.
- 6.7 **Time Delay** Time delays shall be installed on all total flooding CO<sub>2</sub> systems and considered for all local application systems. The time delays shall consist of either a mechanical or pneumatic operator.
- 6.8 **Supervision** Supervision shall be provided on all lockout devices and system discharge for both high and low pressure systems. Supervision shall also be provided for the following components on a low pressure system:
- Actuation Line Pressure
  - High Tank Level
  - Low Tank Level
- 6.9 Activation of the system discharge sensor shall activate all system discharge alarms and warning devices and report to the site wide fire alarm system. All a other supervisory alarms shall report to the site wide alarm system separately or as a common trouble.

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- 6.10 **Piping** Piping shall be limit to a maximum of 300 ft. between the hazard protected and the storage tanks, if possible, and follow the manufactures recommendations concerning pipe schedules and materials..

## 1530-7. STANDPIPES AND HOSE SYSTEMS

- 7.1 Standpipe and hose systems shall be required for higher hazard occupancies, based upon the building type, occupancy rating, applicable codes and standards, and the Improved Risk Criteria. They shall be designed and installed for the class of service and number of systems per building as identified by the Project Design Criteria in accordance with NFPA 14, Standpipe and Hose Systems. These systems shall utilize wet fire mains independent of the sprinkler system riser.
- 7.2 **Hose Racks** Hose rack and associated fire fighting equipment shall meet the following requirements:
- (a) Hose racks and associated fire fighting equipment shall be UL listed and/or FM approved. Hose racks shall be UL semiautomatic type provided with a clip suitable for holding a 1-1/2-in. adjustable fog spray nozzle.
  - (b) Hose cabinets (only required where racks must be recessed in walls or in areas where the equipment must be protected against dust, chemicals, etc.) shall be heavy gauge steel body with hollow metal duo-panel door construction and have minimum inside dimensions of 32 in. x 34 in. x 8 in..
  - (c) Fire hose shall be 1-1/2-in. in size, 300 psi tested, 75 ft in length (unless otherwise specified), dacron single jacket with neoprene tube and backing, equipped with the standard fire hose couplings having National Standard threads. Nozzles shall be 1-1/2-in. in size, adjustable fog type, with National Standard threads, and shall be rated for electrical applications.
  - (d) Automatic Drain Connections shall be 1-1/2-in. in size, brass with 1-1/2-in. swivel female inlet and 1-1/2-in. male outlet, both with National Standard threads, shall be capable of draining and venting the hose rack control valve to protect the hose from deterioration due to water seepage and shall be rated for a minimum of 175 psi working pressure.
  - (e) Hose Rack Control Valves shall be 1-1/2-in. in size, brass angle valves having full water way and renewable rubber disc, have a 1-1/2-in. female pipe thread inlet and 1-1/2-in. male National Standard threads and shall be rated for a minimum of 175 psi working pressure.

## 1530-8. PORTABLE FIRE EXTINGUISHERS

- 8.1 Portable fire extinguishers shall be required in all buildings as determined by the OC Facility FPE, and installed in accordance with NFPA 10, Portable Fire Extinguishers. All extinguishers shall be UL listed and furnished complete

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with wall mounting brackets, hardware, and location placard. The OC shall furnish portable extinguishers at the time of building occupancy, and will continue to maintain and service the extinguishers for the life of the facility. The AE is not responsible for the layout of portable fire extinguishers, but is responsible to provide construction details at inset fire extinguisher locations.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: FIRE WATER STORAGE AND  
DISTRIBUTION****DATE: January 1997****SECTION: 1535****1535-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 0266-1, Codes and Standards

**1.2 Referenced Codes and Standards**

- C FM Data Sheet 3-2, Water Tanks for Fire Protection
- C FM Data Sheet 3-3, Cross Connections
- C FM Data Sheet 3-7N, Centrifugal Fire Pumps
- C FM Data Sheet 3-10, Installation and Maintenance of Private Fire Service Mains and Their Appurtenances
- C NFPA 20, Installation of Centrifugal Fire Pumps
- C NFPA 22, Water Tanks for Private Fire Protection
- C NFPA 24, Installation of Private Fire Service Mains and Their Appurtenances

**1535-2. FIRE WATER SYSTEM REQUIREMENTS**

- 2.1** The water system at DOE-ID facilities normally consists of deep well pumps, water tank(s), fire pumps and distribution piping systems. Fire suppression system design for new facilities shall include the use of dedicated fire water supply and dedicated piping runs in areas where separate fire water and utility water systems exist. In areas where the fire water and utility water supply systems are not separate, both supplies shall be a single feeder from the supply main or from a single feeder that is separated as the feeder enters the facility.

**Note:** For existing combined fire protection and utility systems, this also includes utility pumps. For these systems, the utility pumps shall be designed to supply all utility water needs without resorting to the use of a fire pump.

- 2.2** Evaluation of the required water supply and flow for fire water systems shall consider fire hose stream and fire sprinkler demands.

**Note:** Some existing facilities have a combined water supply system and header for utility, process, and fire protection purposes. Water supply considerations for these systems must include utility and process needs.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: FIRE WATER STORAGE AND  
DISTRIBUTION****DATE: January 1997****SECTION: 1535****1535-3. WATER SUPPLY TANKS**

- 3.1 Fire water storage tanks shall be designed in accordance with NFPA 22, FM Data Sheet 3-2 and the civil design requirements specified in Section 0266. The size of the tank shall be based on the highest estimated fire water demand (sprinklers plus hose streams). The duration requirements shall be based on tables used in FM, Industrial Risk Insurers (IRI) and NFPA codes and standards. The tank size shall be based on the highest estimated water demand for all uses.
- 3.2 Fire water storage tanks at DOE-ID facilities shall be equipped with an alarm device that will transmit low level and low temperature supervisory alarm signals to the Site Alarm System or responsible fire department when the level or temperature drops to a point determined by the OC Facility FPE.
- 3.3 Where dual tanks are provided, the supply piping from the deep well pumps and the discharge piping shall be arranged so that either tank can be taken out of service for maintenance.

**1535-4. FIRE PUMPS**

- 4.1 Fire pumps shall be designed, installed, and tested in accordance with NFPA 20, FM 3-7N, Centrifugal Fire Pumps, and shall operate at a minimum of 125 psi at rated flow capacity.
- 4.2 Fire pumps, controls, and related equipment shall be UL and/or FM approved for fire pump use.
- 4.3 Fire pumps shall be protected against damage caused by fire or water flooding. They shall be housed in a separate noncombustible pump house away from other buildings and near the water storage tank. When it is necessary for the pump room to be located inside a plant building, the room shall be separated by minimum 3-hour rated construction. The pump room shall be of ample size and the piping and equipment arranged to make them readily accessible for operation and repair.
- 4.4 Fire pumps shall be automatically controlled and arranged to start when the pressure on the fire water system drops to a predetermined point determined by the OC Facility FPE. Pressure pumps (jockey makeup pumps) shall maintain pressure on the system so fire pumps are always on standby unless needed for response to a fire emergency.
- 4.5 Supervisory alarms that signify when a fire pump is running, automatic pump controller position switch status, "power available" on electric motor driven pumps, and pump controller trouble condition, shall be provided and shall annunciate at the Site Alarm System, and to a constantly attended location, to a building annunciation panel or to the responsible fire department.
- 4.6 Fire pumps shall be sized to deliver the highest estimated fire water demand for both sprinklers and hose streams. Normally two fire pumps are required, unless otherwise approved by the OC Facility FPE. One electric-driven and one diesel engine driven fire pump, or two diesel engine driven pumps would be considered equivalent.
- 4.7 Fire pumps shall be provided with a means of testing, e.g., flow meters or test headers, designed in accordance with NFPA 20. Where flow meters are used, return flow should be piped back

**DOE-ID ARCHITECTURAL  
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to the supply tank, not to the intake side of the pump.

**1535-5. FIRE WATER DISTRIBUTION SYSTEM**

**5.1 Fire Water Distribution Piping System** Each facility requiring water flow for a fire suppression system shall have a water main system adequate to supply expected fire protection needs, and shall meet the following recommended guidelines:

- C The maximum number of devices allowed to be affected by a single line segment isolation is five.
- C Primary Facility Distribution Loops shall be not less than 10 in. in diameter.
- C Secondary Facility Distribution Loops shall be not less than 8 in. in diameter.
- C Six-inch lines may not feed more than one device. Mains supplying two or more devices shall be a minimum of 8 in. in diameter.
- C See Section 0266 for additional requirements.

**5.2 Underground Fire Main Appurtenances** Underground fire water piping, fittings and valves shall meet requirements of, and be installed in accordance with NFPA 24, and FM 3-10. Thrust blocks, rodding or equivalent restraints shall be provided for one piping section length on each side of fittings which result in a change of direction.

- C Underground control valves for fire water systems, existing combined fire and service water systems, and fire sprinkler systems shall be equipped with UL listed and/or FM approved indicating valves such as PIVs or butterfly post indicator valve assemblies PIVAs. Sectional control valves shall be supervised unless otherwise approved by the DOE-ID AHJ. Sprinkler system valves shall be provided with a supervisory alarm switch. This switch shall actuate a transmitter sending a signal to the Site Alarm System or responsible fire department when the valve is closed. Underground control valves for the fire hydrant lines shall be provided with a valve box extending to finished grade level.
- C The number and location of sectional control valves shall be such that various sections of the fire water loop can be isolated without shutting off the entire loop. These valves should be installed to isolate a maximum five devices (hydrants or sprinkler systems) or 2,000 ft of main, whichever occurs first. Valve location and height shall be as necessary for ease of operation and to preclude obstruction by snow, ice, etc.

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## 1535-6. FIRE HYDRANTS

- 6.1 **Fire Hydrant Locations** No major building shall have less than two hydrants within 300 ft unless approved by DOE-ID AHJ. Yard systems should utilize the "loop" concept whenever possible with provisions for further expansion. The "loop" concept is to provide a two direction feed, and is not necessarily a piping loop around buildings.
- C Hydrants shall be located along side main plant roads. Hydrants should be within 15 ft of the road.
- 6.2 **Fire Hydrant Design Criteria** Hydrants shall be installed in accordance with NFPA 24. Hydrants shall be set so that the 2-1/2-in. hose connections are 20 in. (plus or minus 2 in.) above finished ground level, and the pumper connection is facing a road.
- C Hydrants shall be dry barrel and UL and/or FM approved, shall open counter-clockwise, and shall have two 2-1/2-in. hose connections and one 4-1/2-in. pumper connection, all with National Standard threads.
- C A curb box (key valve) isolation valve shall be installed in each hydrant line near the hydrant.
- C Fire hydrants and valves so located as to be subject to damage by moving vehicles shall be adequately protected. Where barricade posts are used they must be set in such a manner as to afford complete protection and provide a clearance of at least 3 ft around the hydrant barrel and not block any of the discharge ports. The distance between posts should not exceed 6 ft. Posts shall be constructed of railroad steel rail or 4-in. steel pipe filled with concrete. Posts shall be firmly secured in the ground at a minimum depth of 3 ft. Tops of posts shall be approximately 42 in. above finished grade. Posts shall be painted yellow for visibility.
- 6.3 **Fire Hose Houses** The OC Facility FPE shall determine the need for, location of and identify any necessary equipment for any required fire hose hoses at INEL facilities.



**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE:** PIPING-GENERAL REQUIREMENTS  
**DATE:** January 1997 **SECTION:** 1540**1540-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C ASME/ANSI B31.1, Power Piping.
- C ASME/ANSI B31.3, Chemical Plant and Petroleum Refinery Piping.
- C ASME/ANSI B31.9, Building Service Piping.
- C IAPMO, Uniform Plumbing Code
- C NFPA 54/ANSI A223.1, National Fuel Gas Code.
- C NFPA 58, Standard for the Storage and Handling of Liquefied Petroleum Gases.

**1540-2. GENERAL**

The following requirements apply to all the piping sections in this division.

- 2.1 For welding of pressure piping see Section 0532.
- 2.2 For requirements for underground piping see Section 0260.
- 2.3 Pipe insulation and other similar materials containing asbestos shall not be used. Pipe insulation shall be compatible with the piping material.
- 2.4 The designer should coordinate piping locations with the electrical designer when using common spaces for piping runs. See the NEC 310-10 and 384-2 for specific requirements. Hot pipes whose temperatures at the exterior surfaces will normally exceed 86°F (30°C) shall not be routed closer than 6 in. to an electrical raceway.
- 2.5 The location of potential leak points such as valves should be established to minimize economic losses if a leak should occur. This is particularly important in piping systems containing acids or other hazardous fluids. If this is not possible, the use of welded fittings and sealed bellows-type valves is required in these areas.
- 2.6 See Appendix M for piping material requirements at ICPP.
- 2.7 Swagelok<sup>®</sup> (Crawford) compression fittings shall be used where tubing is permitted.
- 2.8 Maintenance shall be a primary consideration in the design of piping systems. Prevention of plugging and clearing of plugs when they occur shall be considered in the design. Systems should be designed so that pockets or traps are eliminated and piping can be flushed and drained, except where loop seals are included in the design. Connections suitable for remote handling shall be used when required by the project design criteria.

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- 2.9 Teflon<sup>®</sup> shall not be used for gasket material, or as a component part of any valve or other piece of equipment subject to ionizing radiation where life cycle exposure exceeds 100R.

**1540-3. COLOR CODING AND IDENTIFICATION OF PIPING**

- 3.1 In general, all exposed piping shall be color coded and identified in accordance with ANSI A-13-1. It is the intent of this standard that the identification method of above ground piping is by English text that allows the contents to be readily identified. Flow direction should be also shown by arrows. For in-cell piping, see 3.3 below.
- 3.2 All piping and equipment shall be identified and numbered on design drawings in accordance with established site standards, which will be provided by the OC. Piping identification legends and symbols for ICPP shall conform to the appropriate ICPP drawing listed in Appendix D.
- 3.3 In locations such as hot process cells, remote handling cells, etc., where identification by stencil or paint may not be feasible because of periodic cleaning with highly corrosive cleaning solutions, the piping shall be identified with beaded chain or cable stainless steel tags containing the line or equipment designation.
- 3.4 In addition to the requirements specified herein, all pipelines and equipment at ICPP shall be color coded and identified according to Appendix M of this standard and shall be tagged with beaded chain or steel cable stainless steel tags displaying the pipe or equipment number as shown on the drawings. The tags shall be fabricated from 300 series austenitic stainless steel metal strips 3/4 in. wide, 24 gauge minimum thickness, with 3/16 in. high letters stamped on the metal surface. Tagging for pipe shall be done at approximately 20 ft intervals with at least one tag in each room. Any pipes entering or leaving a room shall be tagged on each side of the wall. The tags shall be attached to the pipe or austenitic equipment with austenitic stainless steel bead chain or austenitic stainless steel cable. When tagging valves, the bead chain shall be attached to the valve stem or yoke. Remotely replaceable equipment, such as valve jumpers, instrument jumpers, etc., shall also be identified and tagged.

**1540-4. CATHODIC PROTECTION OF BURIED PIPE**

- 4.1 Cathodic protection requirements shall be provided by the project design criteria. See AES-1660-4 for design requirements.

**1540-5. SPECIAL CONSIDERATIONS FOR HAZARDOUS AND CORROSIVE MATERIAL PIPING**

- 5.1 Piping systems containing radioactive fluids shall meet any additional requirements specified in the project design criteria.
- 5.2 All flanges and valve stems in hazardous/corrosive chemical service shall be equipped with protective shields.

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- 5.3 Loop seals shall not be used to prevent backflow of contaminated gases unless no other practical means are available. Systems shall be designed to minimize exposure of maintenance personnel to radiation or hazardous materials.
- 5.4 Full-penetration butt welds, when feasible, are the preferred joints for pipelines where corrosion or contamination is a concern. When modifying existing pipelines in contaminated and radiation areas where butt welding is not practical due to ALARA considerations, purging difficulties, or access constraints, then socket welds are recommended as the best second choice if the corrosion service allows it. Consult the requirements on welded joints in metallic piping in ASME/ANSI B31.3.
- 5.5 NPT fittings are not allowed in corrosion services and radioactively contaminated services except for instruments and equipment where welded ends are not available (such as pressure gages, pumps, etc.). Butt-weld or socket-weld joints are preferred in all other cases. Consideration should be given to boring out these NPT fittings for equipment described above for socket-welding where practical (such as for pumps). Backwelding of NPT fittings does not substantially mitigate the poor corrosion performance of a threaded connection and shall only be allowed with prior written approval of the OC's AE.
- 5.6 Where tubing and fittings are used in applications having direct or indirect contact with either radioactive contamination or corrosive chemicals, they shall be fabricated of an austenitic stainless steel as a minimum or a suitable corrosion resistant material.
- 5.7 Consideration shall be given to installing valves and equipment with "Grayloc" type single bolt swingout type fittings whenever practical to allow removal or maintenance without dismantling the associated piping.
- 5.8 Radioactive and hazardous material transfer lines shall be routed inside buildings or enclosures where possible to minimize length of buried pipelines. The design shall consider the need for protection of the primary line from external corrosion. Cathodic protection or separation of the primary line from the soil may be necessary.
- 5.9 Buried pipelines for transporting hazardous materials shall receive particular design attention with regard to corrosion or possible mechanical damage from expansion forces, future excavation, earth settlement, vibration, seismic loads, surcharge, other live loads and dead loads. Piping requirements located in 40-CFR 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks shall be followed where applicable. Where specified in the design criteria, buried pipelines carrying highly radioactive and other hazardous liquids or solids shall be doubly contained, i.e., the primary pipeline containing the contaminant shall be fully encased and supported inside a corrosion-resistant, leak-tight pipe duct. The outer or casing line shall be so designed as to permit detection of any leakage from the primary line (sampling sumps, radiation detectors, etc.) and shall permit periodic leak testing of the casing line. Design shall include the following considerations:
- (a) Encasement of pipeways is required for protection of pipelines that carry highly radioactive wastes. Drains from a series of encasements should culminate at a single sample point. Automated routine monitoring, using a sampling system and radiation detectors, shall be considered. Individual sump radioactive detectors shall be

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considered. Individual sumps and risers must provide for manual sampling to determine which encasement contains leaking pipe and which primary pipe is leaking.

- (b) The primary line and the encasement pipe shall be separated by appropriate spacers. The encasement pipe shall slope to a collection point to provide drainage for leaks from the primary line.
  - (c) Connections to existing underground lines carrying radioactive materials shall be made in encasements, pipe tunnels, or manifold vaults to prevent potential leakage into the soil. Consideration shall be given to construction of a manifold vault adjacent to any multi-source tank vault to permit addition or removal of lines draining to the tank.
  - (d) Unmonitored vents and vent drain lines shall not be connected to underground solution transfer lines carrying radioactive materials.
- 5.10** Unless no other practical means are available, drain lines for radioactively contaminated waste shall not use liquid seal traps (loop seals) for preventing backflow of gases; provision shall be made to prevent the backflow of contaminated gas by other means, such as maintaining a negative pressure on the drain system, use of self-closing check valves, etc. In addition, all drain fixtures for radioactive drain lines shall be provided with caps or plugs to block off the fixture when not in use. The drain system must be a separate system, i.e., no permanent connections to any other system.
- 5.11** Notches, cracks, crevices, or rough surfaces which might retain radioactive materials or contribute to corrosion shall be avoided in the design of process piping.
- 5.12** Every pipe entering a process cell shall be equipped with a suitable block valve. Piping contacted by process solutions shall be equipped with a packless block valve immediately outside the cell wall. Piping contacted by process solutions in a normally pressurized system may require a check valve in addition to the packless block valve. Piping that is not contacted by process solutions in normal operation may be equipped with a block valve. Piping that is not contacted by process solutions except by failure of a pressure boundary component may be equipped with a gate valve. In every case, the primary block valve and/or check valve shall be of equivalent corrosion resistant material to the associated in-cell piping.
- 5.13** Off-gas systems must be properly engineered for the risk involved, i.e., sufficient capacity, properly scrubbed, filtered, and discharged to the outside.
- 5.14** Acid or caustic materials handling equipment, i.e., piping systems, tanks, pumps, structural supports to such equipment, etc. must be compatible with the material they will be handling. This compatibility requirement extends to external fasteners which are normally not in contact with acid solutions (wetted) but may be exposed during a spill. Corrosion-resistant materials for each individual application shall be used and corrosion allowances shall be evaluated and used for each application.
- 5.15** Acid systems must be totally bermed. If tanks, pipes, and pumps are located in a chemical handling room, then that room should be considered a total acid handling area, properly bermed, appropriately drained, correctly posted as to hazard(s), and the berm provided with a stainless steel liner or approved protective paint.

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- 5.16 There should be no penetrations in the floor of the bermed area or in the berm itself, except for a floor drain to an approved holding tank.
- 5.17 The acid handling area must be isolated physically, including the heating and ventilation equipment, from other areas within the facility.
- 5.18 Spill control equipment should be located away from the projected spill area to assure access; and consideration should also be given to locating staging areas in response to such projected spills.

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ENGINEERING STANDARDS****TITLE: PLUMBING SYSTEMS**  
**DATE: August 1998****SECTION: 1541****1541-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- X AES 0100-1, Codes and Standards
- X IAMPO, Uniform Plumbing Code

**1541-2. GENERAL**

- 2.1 Plumbing includes water supply and sewerage piping for potable water, drains, waste piping and vent piping. Also included are plumbing fixtures, pipe supports and other accessories as needed to provide a complete plumbing system. See Division 2, Sections 0260, 0266 and 0270 for water distribution and sewer system requirements.

**1541-3. PLUMBING**

- 3.1 Plumbing systems shall comply with the Uniform Plumbing Code and shall be selected based on the best combination of performance, cost and maintenance.
- 3.2 The number of plumbing fixtures shall comply with the UBC Chapter 29.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: PLANT UTILITY PIPING**  
**DATE: August 1998****SECTION: 1542****1542-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- AES 1540-1.1, Applicable Codes and Standards

**1542-2. GENERAL**

- 2.1 Plant utility piping includes piping for raw water, treated water, demineralized water, boiler feedwater, breathing air, plant air, fuel gases, steam, and condensate associated with nonnuclear boilers, and other liquid or gas streams in non-nuclear power generating facilities. Plant utility piping at the INEEL shall be designed and fabricated per the applicable codes and standards and as required by design criteria. Piping and system components at ICPP located in chemical processing buildings, excluding sewerage and firewater piping which are addressed elsewhere, shall be considered chemical process piping. See Section 1543.
- 2.2 Carbon steel pipelines that carry steam or condensate and are buried or located in inaccessible areas shall be of Schedule 80 wall thickness, and heavy wall fittings shall be used.
- 2.3 All joints in buried steam and condensate lines shall be welded. Galvanized piping or other piping materials containing anodic coatings shall not be used for buried pipelines.
- 2.4 Steam valves shall not be quick opening, i.e. quarter turn valves.
- 2.5 Consideration should be given to welded joints on all buried utility lines. All buried lines under concrete slabs shall be welded.
- 2.6 Unions and flanges shall be installed in out-of-cell utility piping systems to allow the maintenance or replacement of equipment unless otherwise required by the project design criteria.
- 2.7 Utility tunnels have been constructed in parts of the INEEL. These tunnels shall be used when available. Use is restricted to nonhazardous fluids such as steam, air, water, O<sub>2</sub> and N<sub>2</sub>; specifically excluded are materials that are flammable, corrosive, explosive, or radioactive. Deviation from these restrictions will not be allowed unless a risk analysis is performed which indicates that the proposed design does not compromise the required level of safety. The determination shall be included in the SAR. "French drains" shall not be used for drainage in utility tunnels. Specific information is available from the OC.
- 2.8 Threaded joints should not be used in gas piping systems over 2 in. in size. See the National Fuel Gas Code handbook for more information.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE:** CHEMICAL PROCESS PIPING  
**DATE:** January 1997 **SECTION:** 1543**1543-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C ASME/ANSI B31.3, Chemical Plant and Petroleum Refinery Piping

**1.2 Referenced Codes and Standards**

- C 40 CFR 264.193 Containment and Detection of Releases

**1543-2. GENERAL**

- 2.1 Piping and system components located in chemical processing facilities, excluding nuclear reactor plumbing, sewerage and firewater piping which are addressed elsewhere, shall be considered chemical process piping. In general, chemical process piping shall be designed and fabricated per ASME/ANSI B31.3. Deviation from the code requirements requires a risk analysis be performed. The results of the risk analysis shall be incorporated into the project documents. For categorization of fluids at each INEL facility (ICPP, TRA, etc.) see the definitions contained in ASME/ANSI B31.3 and the OC. Special provisions for material traceability verification and acceptance shall be incorporated into the project technical specification when the contents of the system warrant it. Material certifications shall be required and both certifications and the materials shall be accepted prior to material installation.
- 2.2 Flanges, valves, and other potential leak sources shall not be located overhead of any personnel access area without provisions for personnel protection.
- 2.3 At the ICPP, where original process lines were tubing, modifications shall be designed with pipe where compatible. Transition from pipe to tube shall be made with Swagelok<sup>®</sup> fittings. Where pipe is not compatible, Swagelok<sup>®</sup> compression fittings and tube shall be used. Where Swagelok<sup>®</sup> compression fittings are not compatible with original Parker flare fittings (Triple-Lok<sup>®</sup>), Parker flare fittings shall be used. Other brands of compression fittings besides Swagelok<sup>®</sup> are not acceptable for use at the INEL in order to standardize on one design and avoid incompatibility problems.
- 2.4 Other types of joints (mechanical) may be used for valves and special equipment that have to be removed for periodic maintenance.
- 2.5 Tanks must meet underground storage tank regulations when applicable. Tanks shall have spargers or mixing capability, sample ports, volume measuring devices, and transfer systems. Waste handling tanks and piping systems shall be designed to take advantage of gravity flow or the use of jets, airlifts, or similar equipment to reduce potential maintenance problems associated with mechanical equipment. Essential steam jet transfer lines on all new installations shall be equipped with thermocouples to detect loss of transfer due to a plugged suction or jet.



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**1543-3. VALVE SELECTION**

- 3.1 Control valves for regulating flow require evaluation of component parts for corrosion and radiation resistance. Design trade-off studies shall be conducted to compare the initial cost of off-the-shelf valves plus the cost of their scheduled replacement in comparison with the cost of special valves with longer service life.
- 3.2 Globe type valves are recommended for process control functions. When a leakproof valve stem is required, the valve shall be the packless type employing a metal bellows seal.
- 3.3 Valves for cell utilities such as steam, air, and water shall be located outside the cells.

**1543-4. FREEZE POTS**

- 4.1 Consideration shall be given to installation of freeze pots in process piping when process valves are not desired for operation but isolation of pipelines may be desirable for clearing of plugged lines. Freeze pots shall be located only on sections that can be conveniently filled with liquid. Cover plates for minimizing ingress of debris, liquids, etc. shall not be welded to both the pot and the process piping. This allows for thermal contraction and expansion. The AE shall provide all necessary calculations to ensure that pipe supports are designed adequately for thermal expansion and contraction of the process pipe. In addition to installation of cover plates, ledges and pockets shall be avoided in the design to eliminate the possibility of contamination traps. The nitrogen line to the freeze pot shall gravity drain with no pockets and shall be sized sufficiently for the service. Nitrogen shall be supplied with a gravity head to avoid vapor locking. There must be a way to add liquid to the process line and hold it up at the freeze pot location without using large volumes of liquid.

**1543-5. GASKETS**

- 5.1 Grafoil® by Union Carbide is the preferred material for valve packing and gaskets. Gaskets containing asbestos shall not be used.
- 5.2 Where spiral-wound metallic gaskets are used, care should be taken in the design and specifying of flanges to ensure that adequate bolt loading can be attained to seat the gaskets per the manufacturers' recommendations.

**1543-6. FITTINGS**

- 6.1 Changes in direction of process piping should be made with long radius elbows or bends. Bends are preferred where practicable, except for solids transport lines, where blinded tees or laterals have been proven to prevent erosion.

**1543-7. BOLTING**

- 7.1 Use of galling resistant bolting materials such as Nitronic 60 stainless steel (UNS S21800) shall be considered for stainless steel piping systems.

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**1543-8. PIPE PENETRATIONS**

- 8.1 Pipe sleeves shall generally be provided when piping passes through masonry, concrete walls, floors, and roofs, except shielding walls as noted in Section 1543-9. Sleeves shall be of sufficient length to pass entirely through walls, partitions, or slabs.
- 8.2 Pipe sleeves in floor slabs shall extend a minimum of 2-in. above the finished floor. Space between the pipe and sleeve shall be packed or sealed and both ends of the sleeve shall be caulked. Sleeves shall be sloped to drain towards process areas. Pipe penetrations through fire separations require sealing around the pipe to a rating equal to that of the walls.

**1543-9. SHIELDING WALL PENETRATIONS**

- 9.1 Piping passing through concrete shielding walls shall normally be embedded in concrete without sleeves. The pipe shall be fabricated with an offset to prevent streaming of radiation through the penetration. It is good design practice to install a row of pipes of each anticipated size that will be required for the process at the time the wall is constructed. Unless otherwise provided in the design criteria, all pipe penetrations shall slope toward the cell.
- 9.2 Unused penetrations may be capped and reserved as spares to provide flexibility for future modification without the necessity of core-drilling through 2-ft. to 6-ft. thick walls. All embedments and penetrations shall be shown on the structural drawings. All embedded pipes should be stainless steel with consideration for welding to permit their use for most process chemicals.
- 9.3 In the case of hazardous waste piping passing through shielding walls, the penetrating pipe must also meet the secondary containment requirements of 40 CFR 264.193.

**1543-10. ACTUATORS**

- 10.1 Pneumatic actuators on all remote control valves located in radiation areas which, through failure of bellows, packing or other seals, would permit possible contamination of the air supply lines with process fluids, shall be vented back to the radiation area.

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ENGINEERING STANDARDS****TITLE: HEATING AND VENTILATION**  
**DATE: August 1998 SECTION: 1550****1550-1. STANDARDS AND CODES****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- AES 0112, Energy Conservation
- CASHRAE Handbooks and Standards
- NFPA Standards applicable to ovens, furnaces and boilers
- NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems
- NFPA 90B, Standard for the Installation of Warm Air Heating and Air Conditioning Systems

**1.2 Referenced Codes and Standards**

- ASME Boiler and Pressure Vessel Codes
- ACGIH, Industrial Ventilation Manual of Recommended Practice

**1550-2. GENERAL**

- 2.1** Heating and ventilating systems should normally be forced air type. Air supplies to occupied areas should be controlled and tempered to provide room temperature and humidity commensurate with recommended levels for comfort ventilation and with DOE guidelines.
- 2.2** Once-through systems shall be employed only in cases where they are economically justified or are essential from the standpoint of health and safety, such as potentially contaminated zone control systems or other process or laboratory areas handling hazardous materials. Where economically feasible on a life cycle basis, facilities containing laboratories shall be provided with air handling systems for laboratory spaces independent from office spaces. Design effort shall optimize control system simplicity.
- 2.3** Design for heating and ventilating systems shall include a schematic flow sheet of the system(s) involved in addition to a narrative description of the control logic. The narrative description is to be provided either on the drawings or included in the specification. Flow sheets shall show all essential components of the system, including controls. All components depicted on the flow sheet shall be identified by the appropriate system of code numbers and/or symbols currently used at the INEEL, and the identification shall be cross-referenced with the component description contained in the technical specifications. Where an equipment or pipeline designation system is already established at the particular plant or area for which the design is being prepared, the AE shall use the existing system for identifying lines and equipment shown on the flow sheet. In preparing preliminary design for Title I work, the AE shall use flow sheets and schematic diagrams.

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- 2.4 The system shall include a means to turn off the heating ventilation and cooling system when it is not in use by occupants, or reduce its operation to freeze protection when justified.

### 1550-3. HVAC DESIGN CRITERIA

- 3.1 Design information for Idaho Falls and INEEL locations is shown in Table 1550-1. Detailed information can be obtained from IDO-12118, Climatology of the INEL. Data for other areas under ID direction will be supplied on request.
- 3.2 HVAC systems that require more than 4000 cfm of outside ventilation air shall require heat recovery equipment if economically justified by life cycle studies.
- 3.3 Fuel supply tanks shall be sized for 30-day supply.
- 3.4 Supply and Interzone Exhaust Air Fans Supply and interzone exhaust air fans shall be interlocked with final exhaust fans to prevent supply and interzone exhaust fan operations unless final exhaust fans are running. This will prevent pressurization of any process room or area should exhaust ventilation fail. Interzone ductwork shall always be negative with respect to the surrounding environment in all Zone I, II, and III areas.
- 3.5 Fans for Contamination Control Exhaust fans for controlling contamination in contaminated areas should be designed in accordance with the following:
- (a) Alarms with readout at a central, manned location shall be provided to indicate fan shutdown and high temperatures, excessive vibration, and other malfunctions as required by the design criteria.
  - (b) Installed spare fans and isolation dampers shall normally be provided for the supply and exhaust air systems. When any fan is inoperative in a system, a backflow damper should automatically isolate the idle fan from the system. Where this is economically unfeasible, consideration shall be given to fan pairs sharing the load such that if one fan fails, the other can maintain partial air movement.
- 3.6 Dampers and Controls Supply, recirculation, process ventilation, and exhaust ducting shall incorporate manual and automatic dampers and controls to distribute, balance, and regulate the movement of air in each room, area, and ventilation system, and to prevent possible backflow. Backflow prevention dampers shall be free-moving and nonbinding. A manual balancing damper shall be provided in each branch duct. Internal grille, register, or diffuser dampers are not a substitute for these dampers.
- 3.7 Positive sealing dampers or valves shall be located so that a bank of filters can be completely isolated from the ventilation system during filter replacement.

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3.8 Manual controls or automatic controls equipped with manual override shall be provided for ventilation systems or components, as required for proper operation and safety. In general, selection of control systems should favor automatic controls in larger and more complex (multizone sensitive duty) systems. In general, every effort should be made to simplify the design and operation of control systems. In addition, the following provisions and guidelines shall be met:

- (a) The preferred method for zone pressure control, is to provide constant exhaust flow and vary supply air volume to maintain the pressure setpoint. Exhaust air volume may be temporarily increased to accommodate breaches in physical containment barriers such as doors opened or hatches removed.
- (b) All flows and pressures requiring either automatic or manual adjustment to maintain and verify confinement zone pressures must be continuously monitored. Local gauges shall always be provided in addition to any monitoring capabilities associated with automatic controls.
- (c) Adjustable damping shall be provided for all automatic flow and pressure control systems as required for stable operation.
- (d) Reference pressure systems used for building zone pressure control and monitoring systems shall have demonstrated acceptable performance in similar applications or field tests prior to incorporation into INEEL designs. Electronic instrumentation and controls shall be given preference to pneumatic equivalents unless cost prohibitive.
- (e) Atmospheric reference headers shall be installed as required to mitigate wind disruption and provide adequate dampened response time; these shall be provided with leak test fittings.
- (f) Control systems shall not be susceptible to radio interference.
- (g) A redundant source of control air should be provided, such as a redundant compressor. A dedicated circuit should be provided for the control electrical service.
- (h) Multiple pitot tube manifolded racks with upstream flow straighteners or other certified apparatus shall be used for flow elements.

3.9 **Fire and Smoke Dampers** Fire and smoke dampers shall be provided in designated fire barriers (wall and floors) and duct passages through exit corridors. Ready access and appropriate labeling shall be provided to dampers, detectors, and release hardware to allow for maintenance testing and repair. Combination fire/smoke related dampers are preferred with motor operated (electrical or pneumatic) automatic reset.

**Exception:** Fire Dampers are not required in ducting that passes through 1 hour rated fire barriers if there are no openings in the ducting as it passes through the fire area, and the ductwork construction provides an equivalent level of protection for the hazard.

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- 3.10 Freeze Protection** Heating system coils used for heating raw outside air, or where there is a possibility of coil freezing, shall be heavy duty, nonfreeze type equipped with face and bypass dampers for controlling the downstream air temperature. The AE should also consider other alternatives in his design to prevent coil freezing based on the project functional and operational requirements. Preheat coils shall be sized to accommodate an outside design temperature of -14°F or -19°F (refer to Table 1550-1) and be installed and protected so they will not freeze during relatively short periods of air temperature as low as -45°F (at maximum air flow rates) by employing the following safeguards:
- (a) Coils shall be positioned vertically where practicable. Where horizontal installation is required, the coils shall be pitched 1/4 in. per ft to drain.
  - (b) Excessive face velocities should be avoided. Oversizing shall be avoided since it increases susceptibility to freeze-ups during certain weather conditions.
  - (c) Vacuum relief at coil inlet shall be provided.
  - (d) Condensate traps shall be sized for maximum load. Condensate traps shall be positioned as far below the coil as possible (preferably 18 in. or more). Condensate traps should discharge to a gravity drain header or condensate pump receiver located below the coil outlet. Do not route discharge from traps to overhead return lines. Condensate traps and drain headers shall not be positioned in the cold air stream or any location where freezing may occur.
  - (e) Manual bypass steam valves shall be provided around all automatic steam valves serving preheat coils.
  - (f) An air temperature sensing element downstream of the preheating coil shall be provided with necessary controls to shut off the fan and/or close the coil face dampers when downstream air drops to +40°F or less.
  - (g) A preheat system shall be located upstream from all other components in outdoor air supplied air handling units.
- 3.11 Penetrations** Penetrations of the building by ventilation ducts shall be kept to a minimum. Penetrations shall be designed to allow the essential systems to function during a DBA.
- 3.12 Power Outages** Where required by the safety analysis, ventilation systems shall be capable of operating during normal power outage at capacities required to maintain confinement of contaminants. The onsite emergency power and air sources and the electrical distribution circuits shall be independent and testable to ensure performance of their safety functions assuming a single failure.

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- 3.13 **Emergency Power** Where required by the safety analysis, critical items of the ventilation system shall be supplied with emergency power, air, and fire suppression water. Controls for these ventilation systems shall be supplied with emergency power and air.
- 3.14 **Power Consumption** Supply and exhaust fans equipped with variable frequency ac motor control shall be considered along with variable inlet vanes for volume control based on economic life cycle studies.
- 3.15 **Maintenance** Provisions shall be made for inspection, maintenance, and/or replacement of components in the supply, exhaust, and filtration system. Generous inspection ports shall be provided for inspection and routine maintenance for all dampers, fans, flow elements, pressure sensors, fire or smoke detectors, and other critical duct internals.
- 3.16 **Independent Shutdown** Provisions shall be made for independent shutdown of ventilation systems where this could possibly be an advantage to operations, maintenance, or emergency procedures such as firefighting.

**1550-4. COMFORT HEATING AND VENTILATION**

- 4.1 **Heating** The inside design temperature for personnel comfort during winter shall be 72°Fdb unless otherwise indicated. Lower design temperatures may be appropriate for the particular application. The following applications indicate the acceptable nominal temperatures.

Space	°Fdb
Storage (heated)	50°
Warehouses	50°
Kitchens	65°
Laundries	65°
Shops (high work activity)	65°
Toilets	68°
Change Rooms	75°

- 4.2 Except where it can be substantiated from recording or engineering computations that the inside relative humidity will be less than 20% for prolonged periods of time, such as to be detrimental to personnel health, winter humidification for personnel comfort shall not be provided. Where such conditions have been substantiated, a design relative humidity of 20% may be used in establishing humidification equipment requirements.

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- 4.3 **Cooling** Cooling should only be provided to the extent necessary to meet the temperature and relative humidity levels recommended by the ASHRAE 90.1 unless special environmental requirements are dictated by special process requirements or sensitive equipment such as electronic data processing equipment or sensitive laboratory equipment.
- 4.4 Cooling may be provided whenever an engineering analysis of the building shows that the inside dry bulb temperature will exceed 76°Fdb during occupied hours using the summer 2-1/2% design conditions for INEEL facilities as specified in ASHRAE Handbook of Fundamentals. Night cool down of the building using 100% outside air ventilation to a temperature of 68°F shall be used in the HVAC system design to reduce or eliminate the need for daytime cooling. Night cool down shall be included in the engineering analysis to determine the need for daytime cooling. Where daytime cooling is justified by the above criteria, adiabatic or evaporative cooling shall be used unless an engineering analysis indicates excessive humidity will result. Evaporative coolers (as well as any filters) shall use fire-rated media of at least UL 900 Class 2.
- 4.5 Inside design temperatures for personal comfort cooling shall be 76°F dry bulb and 64°F wet bulb.
- 4.6 **Telephone Rooms** The room shall be provided with a HVAC system capable of keeping the room temperatures between 45°F and 80°F. This may be provided from the building HVAC or a separate dedicated system.

**1550-5. MATERIALS AND EQUIPMENT**

- 5.1 **Materials** Materials for the ventilation systems should be selected according to such safety considerations as corrosion and fire resistance, long operating life, strength to withstand accident conditions, and smooth surface finish to aid in decontamination. Selection and specification of materials and equipment for comfort and other nonsensitive duty H&V systems shall be economically optimized. The use of corrosion-resistant materials for ductwork, valves, instrument sensing lines, and the like shall be limited to those service environments and applications requiring such properties. Backflow prevented upstream air systems serving sensitive duty downstream systems shall be likewise evaluated for possible relaxation of material requirements of the downstream system. Such relaxation is not allowable if reliability of the downstream system is compromised.
- 5.2 **Equipment** Equipment items must be identified on drawings and flow diagrams and must be designed, fabricated, and installed in accordance with the latest edition of the American Conference of Governmental Industrial Hygienists and ASHRAE guidelines.



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- 5.3 Oil fired equipment shall be equipped with burner safety combustion controls and interlocks designed in accordance with NFPA 85A through 85G.
- 5.4 **Boilers** Steam or hot water boilers used for heating purposes only shall be sized according to ASHRAE 90.1. All boilers shall be in conformance with Section IV of the ASME Boiler and Pressure Vessel Code. Specifications for boiler installations shall require the CS to obtain inspection and certification that the boiler installation meets ASME Code. Inspection and certification to meet state and local requirements shall be required unless a waiver is approved by ID and the OC. These inspections shall be completed prior to the time of initial startup and operation. These inspections and certification shall be made by a certified inspector having local jurisdiction. See 1560-2.8 for additional information on boilers and pressure vessels.
- 5.5 Copies (3 minimum) of certification shall be furnished to the OC prior to acceptance of the completed installation. Specifications shall also require:
- (a) A hydrostatic test of all boiler installations (including installed package boilers to ensure that no damage was sustained during transit and subsequent handling) to verify system integrity.
  - (b) An operating test to verify specified boiler performance requirements (steam quantity, fuel consumption, efficiency, adequate automatic control, etc.). This test shall be based on a minimum of eight hours of continuous operation of the boiler.
  - (c) A test for steam quantity and moisture content (not required on boilers operating at 15 psig or less).
  - (d) A hot boil-out cleaning of the boiler internals using cleaning compounds and procedures recommended by the boiler manufacturer.
- 5.6 **Ducts and Housings** Ducts and housings should be designed, fabricated, and erected with a minimum of ledges, protrusions, and crevices.
- 5.7 Duct runs and flow distributors/straighteners should ensure uniform air flow past monitoring and sampling stations and through filter installations. Smooth transitions between duct sizes shall be provided. Proximity of such elements to upstream and downstream flow disruptions such as fans and elbows shall be optimized.

## 1550-6. VENTILATION SYSTEM TESTING

- 6.1 The design shall include provisions to facilitate periodic testing of ventilation systems for operability and required functional performance. The capability shall be provided to test (under conditions as close to design as practicable) the operating sequence for startup of ventilation systems, including transfer to alternate power sources, and to verify design air flow, pressure, and temperature delivery capability.

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- 6.2 High efficiency air cleaning systems shall be designed for convenient, repetitive, and reliable in-place testing of each testable stage in accordance with ANSI N510, 1980, or a similar test of equal reliability, unless economically prohibitive. Provisions shall be made for in-place testing of each testable stage of a high efficiency air cleaning system, such as aerosol injection ports, sampling ports, connecting and bypass ductwork. Consideration shall also be given to the economics of the requirement; however it is generally cheaper to use test sections to meet design criteria than to take limited credit for redundant banks.
- 6.3 Components or devices which are required to function under emergency conditions (such as loss of normal electrical power or instrument air) shall be capable of being tested periodically, preferably without interruption of operations.

**1550-7. MONITORING AND ALARMS**

- 7.1 Ventilation systems shall be appropriately instrumented to read out and alarm in one or more central control areas. These areas shall be designed to permit occupancy and ability to operate ventilation systems safely during normal or abnormal conditions.
- 7.2 The system shall include readout from appropriate surveillance instrumentation for all essential functions of the ventilation systems. Instrumentation requirements for crucial portions of this system shall be designed after a suitable fail-safe analysis and shall include appropriate redundancy.
- 7.3 Visual and/or audible alarms for significant abnormal conditions such as filter plugging or breakthrough, low air flow or reversal, fire system activation, high stack effluent activity, etc., shall be readily determinable, preferably on a continuous basis and in a central, continuously manned location.
- 7.4 Where under normal or abnormal conditions, combustible quantities of airborne solvents, gases, and vapors could possibly be present in a ventilation system, continuous monitoring systems suitable for monitoring such substances shall be included in the design, with readout normally in the control room. Ventilation systems shall be designed with flow rates or other features to preclude the possibility of an explosion, as evaluated in the safety analysis document.
- 7.5 Where possible, all gauges, indicators, and controllers shall have scales providing direct readings in appropriate engineering units. Only power of 10 scale factors will be acceptable.
- 7.6 All heating and cooling coils shall have inlet and outlet temperature indicators. Dial thermometers will be acceptable if in visible and accessible locations.

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**TABLE 1550-1. DESIGN INFORMATION FOR THE INEEL, IDAHO FALLS, IDAHO,**

LOCATION	LATITUDE	LONGITUDE	ALTITUDE	PREVAILING WIND	ANNUAL HEATING DEGREE DAYS	AVERAGE WINTER TEMPERATURE <sup>a</sup> (°F)
INEEL	43° 32'	112° 57'	4938	WSW	8640 <sup>b</sup>	25.71°
Idaho Falls	43° 3'	112° 0'	4730	SW	8619 <sup>c</sup>	29.2°

**~~OUTSIDE DESIGN CONDITIONS~~**
**INEEL SITE DATA<sup>d</sup>:**

WINTER	SUMMER	APPLICATION
-19°F <sup>e</sup>	95°Fdb/61°F wb	Process, laboratory and other uses where close temperature and humidity control is required by project criteria
-14°F <sup>e</sup>	93°Fdb/61°Fwb	Personnel comfort and general HVAC systems
--	61°Fwb	Cooling towers, and research and technical type systems
--	100°Fdb	Air cooled condensers <sup>f</sup>

- a. Seven (7) month period, October to April.
- b. From DOE/ID-12118, Climatology of the INEL, 2nd Edition.
- c. From National Weather Service, Boise, Idaho, Years 1941 to 1970.
- d. Data From ARLFRD, NOAA, INEEL, February 1992.
- e. Data from ASHRAE Fundamentals Handbook, 1989.
- f. Temperatures should be verified by actual site conditions.
- g. Preheat coils must be sized too suit the outside design temperature, but shall be installed and protected so they will not freeze during periods of air temperatures as low as -45°F at design air flow.

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**TABLE 1550-1. DESIGN INFORMATION FOR THE INEEL, IDAHO FALLS, IDAHO,**
**OUTSIDE DESIGN CONDITIONS**
**IDAHO FALLS DATA<sup>1</sup>:**

WINTER	SUMMER	APPLICATION
-11°F <sup>2</sup>	89°Fdb/61°Fwb	Process, laboratory and other uses where close temperature and humidity control is required by project criteria
-6°F <sup>2</sup>	87°Fdb/61°Fwb	Personnel comfort and general HVAC systems
--	65°Fwb	Cooling towers, and research and technical type systems
--	94°Fdb	Air cooled condensers <sup>3</sup>
a. Seven (7) month period, October to April. b. From DOE/ID-12118, <u>Climatology of the INEL</u> , 2nd Edition. c. From National Weather Service, Boise, Idaho, Years 1941 to 1970. d. Data From ARLFRD, NOAA, INEEL, February 1992. e. Data from <u>ASHRAE Fundamentals Handbook</u> , 1989. f. Temperatures should be verified by actual site conditions. g. Preheat coils must be sized too suit the outside design temperature, but shall be installed and protected so they will not freeze during periods of air temperatures as low as -45°F at design air flow.		

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**1551-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 1550, Heating and Ventilation
- C AES 1595, Controls
- C DOE G 420.1X, Implementation Guide for Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria

**1.2 Referenced Codes and Standards**

- C ERDA 76-21, Nuclear Air Cleaning Handbook

**1551-2. GENERAL INFORMATION**

- 2.1 Ventilation systems shall be designed to confine radioactive materials under normal and DBA conditions and to limit radioactive discharges to ALARA levels. The HVAC system shall provide the design pressure differentials, volume changes, temperature, air cleaning, and humidity control of building atmosphere, while addressing and minimizing the potential of crossflow between the HVAC, utility, and waste systems. Specific design guidance and requirements for nuclear and sensitive duty HVAC systems will be provided in the project design criteria.
- 2.2 A ventilation system shall serve all enclosure systems (such as reactor compartments or process cells) to maintain a negative pressure inside the enclosure with respect to the operating area. Consideration shall be given to the removal of heat, explosive and corrosive gases, toxic and particulate gases, and other contaminants. Air or inert gas from glove boxes or other process enclosures where wet chemical operations take place shall be treated if necessary to protect the ventilation ductwork, final filters, and filter plenums from exposure to wetting or deleterious chemical attack.
- 2.3 The system shall be designed to automatically ensure an inflow of air of 125 linear feet per minute through a credible breach (as defined in the design criteria) in the enclosure system. Design consideration shall be given to the effects of normal maintenance enclosure breaches and their effect on pressure gradients between the breached enclosure system and adjacent operating areas. The design of the enclosure ventilation flow pattern shall act to minimize the spread of fire. Small enclosure systems shall be provided with positive pressure-relief valves (connected into the exhaust system) to prevent pressurization of the system. Consideration shall be given to provisions for all necessary cleanup and detection equipment for noxious chemicals. Use of downdraft ventilation within enclosures shall be considered as a means of reducing fire and contamination spread potential.

**1551-3. VENTILATION CONFINEMENT**

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- 3.1 Ventilation systems serve as one of the principal secondary confinement barriers in a confinement barrier system guarding against the release of radioactive or other potentially dangerous materials during normal or abnormal design conditions. Ventilation systems are subject to variations in operating temperatures and pressures and to environmental conditions associated with normal operation, maintenance, plant shutdown, and testing. They may also be subject to and designed for the effects of natural phenomena such as seismic motion, floods, missiles, tornadoes, fires, explosion, and other accidents.
- 3.2 Ventilation systems shall be designed to withstand any credible fire or explosion and continue to act as a confinement barrier. Fire protection features of ventilation systems shall include fire-resistant materials of construction, fire-resistant filters, heat and smoke detectors, alarms, heat removal devices, fire-suppression equipment, and fire doors and dampers or other proven devices to restrict the spread of fires. Design of the system shall include an analysis to ensure that the ventilation system is capable of operating under design basis fire conditions as specified in the design criteria. It shall be designed to the maximum extent possible to withdraw the heat and smoke safely through appropriate ventilation channels so that products of combustion are not spread beyond the room of origin.
- 3.2 Failure of an single component or control function shall not compromise minimum adequate ventilation.

**1551-4. PRESSURE ZONES (CONFINEMENT ZONES)**

- 4.1 A building or facility shall be divided into hazard class confinement zones as outlined in ERDA 76-21, Nuclear Air Cleaning Handbook; except, at INEL, Zone I refers to low hazard, Zone III is high hazard, and "clean area" equates to Zone IV in that handbook. In addition, protective clothing requirements may differ. Not all of the zones listed below would be required in all buildings, and an entire building could quite possibly be designated as a single zone. However, there shall be a minimum of two negative pressure zones within hazardous process and reactor buildings at the INEL.
  - (a) Zone III classification applies to the interior of hot cells, process cells, glove boxes, or other containments for handling highly radioactive materials. Containment features must prevent the spread of radioactive or hazardous material within and release from the building under both normal operating and upset conditions up to and including the DBA for the facility. Complete isolation (physical separation) from neighboring facilities, laboratories, shop area, and operating areas is necessary. A high efficiency filter, preferably HEPA type, is required in the air inlet.
  - (b) Zone II classification applies to glove box operating areas, hot cell service or maintenance areas, or other building spaces where high levels of radioactive contamination could be present. Particularly hazardous operations are generally conducted in glove boxes. Sufficient air supply to produce inward airflow into glove box ports (with one glove removed) of at least 125 linear fpm is required.
  - (c) Fume hood performance is affected by the hoods location, sash arrangement, room air currents and hood construction. New installations or relocation's of fume hood shall consider the requirements of NFPA 45, OSHA 1910.1450, ANSI/AIHA Z9.5, and the ASHRAE Applications handbook. After installation, and on a yearly basis, hoods shall

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be tested for performance using ANSI/ASHRAE 110. The results will then be evaluated to minimize worker exposure.

- (d) Zone I classification is assigned to hot cell or process cell operating areas and other potentially contaminated areas that are adjacent to Zone II and III process or maintenance areas. Also included are general chemical laboratories, maintenance areas, and other general working areas which are usually nonradioactive but which may be subject to low levels of radiation in the air. Chemical fume hoods are required for operations which could produce greater than CG for radioactive material or TLV for toxic or noxious material as defined in ERDA 76-21, Nuclear Air Cleaning Handbook.
- (e) "Clean Area" classification is assigned to areas that are normally free of contamination, such as control rooms, offices, and nonradioactive shop and storage areas. No specific protective clothing is required. Radiation monitoring may be required at exit points.

- 4.2 There shall be a negative differential pressure of at least 0.1 in. wg maintained between the building and outside atmosphere and between zones, except for the Zone III and II confinements, which shall be a minimum of 0.5 in. wg negative with respect to adjacent areas or spaces. However, consideration shall be given to designing office areas and control rooms at atmospheric or slightly positive pressure levels based on economic, safety, and evacuation personnel flow considerations.

#### 1551-5. AIR SUPPLY SYSTEM

- 5.1 Air supplied to the facility should be filtered to minimize loading of exhaust filters with atmospheric dirt and dust. During normal operation, ventilation supply air must flow from nonradioactive zones to moderately radioactive zones to highly radioactive zones.
- 5.2 A portion of the air may be recirculated within each zone, thus lessening the load on heating, cooling, and humidifying equipment; however, recirculation in Zone I, II, or III will require specific approval by the OC. Recirculation systems serving potentially contaminated zones shall be equipped with air cleaning equipment and continuous radioactive monitors to assist in maintaining air quality. An important operating principle with respect to air recirculation is that air may not under any circumstance be allowed to enter a zone of lower potential contamination than that from which it was withdrawn.
- 5.3 Outdoor makeup air supply units shall be protected from the weather. Air intakes shall be arranged to minimize the effects of tornadoes, high winds, rain, snow, ice, debris, and adjacent building effluents (such as steam vents) on the operation of the system. Screens shall be provided in air intake louvers for 100% outdoor air systems. The consequences of frost plugging of these screens shall be evaluated and methods to mitigate plugging included as appropriate. Preheat systems may be necessary in areas where icing can cause significant supply filter damage.

#### 1551-6. AIR FLOW

- 6.1 An air flow pattern shall be used that ensures that air flow is from the atmosphere into the building and from noncontaminated areas to potentially contaminated areas and then to those areas normally containing contamination (series air flow pattern).

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- 6.2 These patterns of air flow shall be effected by maintaining pressure differentials between the different building confinement zones and between the building and the environment and by controlling interzone venting in accordance with the design criteria.
- 6.3 Supply air shall be properly conditioned and where possible should be distributed at or near the ceiling of potentially contaminated areas of the facility.
- 6.4 As much as practicable, airborne contamination released from process equipment or hot cells should be directed by air flow patterns for capture by an exhaust point in the immediate vicinity of the release. Air from each Zone I, II, or Zone III area shall be removed near the area of highest contamination potential through area grills or registers equipped with fire-resistant, medium-efficiency filters. The filters should have an atmospheric dust spot efficiency rating of 90% or better.

**1551-7. RECIRCULATION OF INERT GASES**

Design consideration shall be given to recirculation of inert gases to glove boxes and other process enclosures to maximize reuse of such gases. If recirculation is used, the exhaust gas from these enclosures shall be filtered through two stages of HEPA filters in series before being recirculated.

**1551-8. TANK AND VESSEL VENTING (OFF-GAS SYSTEMS)**

- 8.1 All primary confinement tanks shall vent into the primary confinement ventilation system after passage through an adequate off-gas treatment system. Vessel vent lines shall be designed such that inadvertent transfer of solutions or slurries into ventilation systems is prevented.
- 8.2 Consideration shall be given to both automatic and manual controls and overrides to modify system operation during unusual conditions.

**1551-9. BUILDING SEALING**

- 9.1 See 0270, Insulation, Sealing, and Joints.



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**1554-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 1550-1.1, Applicable Codes and Standards
- C AES 1551-1.1, Applicable Codes and Standards

**1.2 Referenced Codes and Standards**

- C UL 900, Test Performance of Air Filter Units
- C NEF 3-45T, Nuclear Standard Specification for HEPA Filters Used by DOE Contractors

**1554-2. GENERAL**

- 2.1 In the design of the filtration system, consideration shall be given to such items as prefilters, scrubbers, process vessel vent systems, HEPA filters, deep bed absorbers and sand filters, glass fiber filters, demisters, distribution baffles, fire suppression systems, heat removal systems, and pressure, temperature, and flow measurement devices. A drain system including tanks to prevent the formation of an unsafe geometry of fission material when water is used in fire suppression activities and injection ports should also be considered. Drains from such systems shall be routed to a contaminated drain system.
- 2.2 It should be noted that filter designations in some DOE Directives may conflict with designations in the ERDA 76-21 Nuclear Air Cleaning Handbook. The designations in ERDA 76-21 shall prevail in the design and specification of filter systems.
- 2.3 Air filters shall be located on the suction side of fans and coils and in other special locations as required for air treatment.
- 2.4 Standardization of the HEPA filtration design and filter protection features shall be required throughout all new facilities, and all existing individual facilities.
- 2.5 All HEPA filters will be equipped with differential pressure instrumentation. Other measurement devices (such as flow and temperature) shall be provided as required by Design Criteria or for proper system operation.

**1554-3. EXHAUST FILTRATION SYSTEM**

- 3.1 High-efficiency air filtering facilities for radioactive or other hazardous service shall be designed in accordance with ERDA 76-21, Nuclear Air Cleaning Handbook. HEPA filters specified for use shall be Type B, nuclear grade, as defined by ERDA 76-21, Nuclear Air Cleaning Handbook and NEF 3-45T, Nuclear Standard Specification for HEPA Filters Used By DOE Contractors (Refer to Table I), and shall be DOP tested at 20% and 100% flow.

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- 3.2 All HEPA filters (or banks of HEPA filters), including those used for backflow prevention, shall be protected by a roughing prefilter. Roughing filters and/or enclosure prefilters are not considered to be radioactive particulate filtration stages, but their use shall be considered to increase fire smoke handling capability and to avoid needless dust loading and plugging of HEPA filters.

#### 1554-4. EXHAUST FILTRATION STAGES

- 4.1 The number of exhaust filtration stages from any area of the facility shall be at least equal to the number required under normal and accident conditions (not to include DBE and DBT). The discharges shall not exceed 10% of those given in the RCG, DOE O 5480.1. If more than five stages are required to comply with DOE Order 5480.1, the system shall be designed to reduce release from the source.
- 4.2 Evaluation of the need for multiple stages of HEPA filters shall be based on the following:
- (a) **Normal Operating Conditions for New Plenums** Design of new plenums for normal operating conditions shall include the following considerations:
1. Design for the number of HEPA filter stages needed to reduce the radioactive material effluent to comply with USNRC Regulatory Guide 3.32 by using the tested-in-place efficiency of 99.97% for an average of 0.3 micron polydispersed DOP for each retestable stage.
  2. Each testable stage of HEPA filters must be retested periodically, and the overall HEPA filter system must also be periodically retested. This applies to all HEPA filter installations. Each individual HEPA filter, both initial installations and replacement, must pass required tests.
- (b) **Accident Conditions for New Plenums** Design of new plenums for accident conditions shall include the following considerations:
1. Design the number of HEPA filter stages needed to control the postulated radioactive material effluent concentration to within the DOE Order 5480.1 reference exposure limits by using 99.9% credit for the first stage of HEPA filter and 99.8% for each succeeding stage of filters, assuming that each stage is individually testable. If each stage is not individually DOP testable, the additional stages should also be given a safety credit of 99.8%. This presumes that adequate protection, such as prefilters, water sprays, baffles, and demisters, are installed. The integrity of the filters shall be maintained throughout the duration of the accident.
  2. For the accident analysis, consider only the first stage. Compute the offsite exposure dose from radioactive particles and compare it with the value given in DOE Order 5480.1, add a second stage, and recompute the offsite exposure dose. Continue these calculations until the offsite exposure dose does not exceed the value given in the order.

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- (c) **Existing Plenums** The number of HEPA filter stages required to reduce the effluent to comply with DOE Order 5480.11 will be based on effluent sampling results and the judgment of the designer and his knowledge of the existing plenum conditions. For design purposes, use 99.8% credit for the entire existing filter unless actual design data is available. Additional HEPA filter stages may be justifiable as the most economical and practical method of reducing the effluent from an existing plenum that leaks excessively due to poor design features; however, the additional pressure drop across such filters must be considered in light of existing system capacity and flow requirements. In any case, the new stage or stages of HEPA filters should be designed and installed with as much integrity as would be provided by the new plenum.

**1554-5. EXHAUST FILTER HOUSING**

- 5.1 Each air exhaust filter housing shall be constructed of noncombustible materials and shall have a rigid mounting frame for the filter. Housings for process installations shall be corrosion resistant. The filter shall be equipped with a knife edge system as shown in Figure 1554-1. It should not leak from outside to inside, inside to outside, or across the filter sealing barrier. On HEPA filter elements, the use of sealing compounds or gasket cements to achieve an acceptable leak rate between filter media and frame is not permissible at any time.
- 5.2 The filter access opening in the housing shall permit filter removal and replacement with minimum exposure to personnel and with minimum release of contaminants outside the housing. Unitized filter housings for radioactive service shall be of the "Bag-In/Bag-Out" type to facilitate safe handling of the filter cartridge.
- 5.3 All new HEPA filter installations that will require in-place testing must be provided with sufficient ductwork (7 to 10 duct diameters) before and after the filter to allow for test aerosol mixing. Test ports and utilities (110 VAC and compressed air) must be provided, consistent with the testing equipment used. Where there is insufficient space available to permit a valid leak check, Flanders (or equivalent) in-place leak-test housing(s) must be installed to facilitate testing. Multiple stage filter installations shall allow a minimum of 10 to 12 duct diameters between each filter or provide another method such as mixing sections to allow for adequate mixing for testing. The housings shall be designed with a "Knife Edge" sealing surface designed for fluid seal or silicone gasket material, a locking device to retain filters in the sealing position and shall contain a proven in-place DOP testing system (inlet upstream and sample outlet downstream of the filters) for individual filter elements within the array. A mixing section similar to that produced by Flanders Filters, Inc., shall be considered for installation between stages of HEPA filtration to minimize required separation distances. This mixing section contains a movable diffuser to increase mixing during DOP testing so that spacing requirements between stages are reduced to two feet.
- 5.4 Housings, filter mounting frames, and ducts shall be designed to withstand system pressure changes without distortion, fatigue, or yielding that results in leakage or bypassing of the filters. Knife edge filter mounting frames must be flat and square within 1/16 in.

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**1554-6. FIRE RESISTANT FILTERS**

- 6.1 Air cleaning equipment and filters provided in systems used strictly for comfort cooling in structures containing no special hazard need comply only with Manufacturer's Recommendations. Use of filter media complying with UL 900 Class 2 is suggested for buildings with no special hazards and normal occupancies.
- 6.2 Supply air filters and prefilters for exhaust filtration systems used in high valve applications and in high hazard and radiological areas shall be UL 900 Class 1 unless specifically approved by ID.
- 6.3 HEPA filtration systems serving as a final means of effluent cleaning should have at least two stages of fire-resistant filters in series in a filter plenum. If it can be determined that the filters can be subjected to sufficient heat to cause failure, the final filters shall be protected by heat removal or sprinkler systems that automatically activate at a preset temperature.
- 6.4 If a heat removal system is deemed necessary, an inlet baffle and a spark arrester and demister shall precede the first stage of filters. If a cooling spray is used for heat removal, it should be followed by a combination spark arrester/demister screen to remove entrained droplets. A roughing filter shall be mounted behind these components to remove the bulk of the draft-carrier debris. Ease of contaminated filter removal should be a design consideration.
- 6.5 Where redundant HEPA filters are required, it is preferred that the primary filter be located as near the source term as practical and the redundant filter be at an accessible location near the discharge.

**1554-7. ATMOSPHERE FILTRATION**

- 7.1 Air or inert gas shall normally enter each ventilated glove box or process cell through at least one fire-resistant HEPA filter and be discharged through at least one fire-resistant prefilter and one fire-resistant HEPA filter to exhaust ductwork leading to a final filter system. In the case of plutonium contaminants, two fire-resistant HEPA filters shall be used in the glove box or process cell exhaust system. Each plutonium contaminant filter system shall be equipped with a temperature and pressure gauge.

**1554-8. REDUNDANCY**

- 8.1 Redundancy shall be provided for all new facility process off-gas and process cell ventilation air by passing it through at least two separate independently-testable HEPA filters prior to discharge to the atmosphere via the off-gas stack.

**1554-9. RADIOACTIVITY CLEANUP**

- 9.1 The exhaust system shall be designed to provide cleanup of radioactivity of the discharge air. There shall be exhaust capacity on demand for appropriate enclosures, cells, or hoods that will promptly cause an inflow of air at least 125 linear ft/min through a ruptured entry way or during similar abnormal operations.

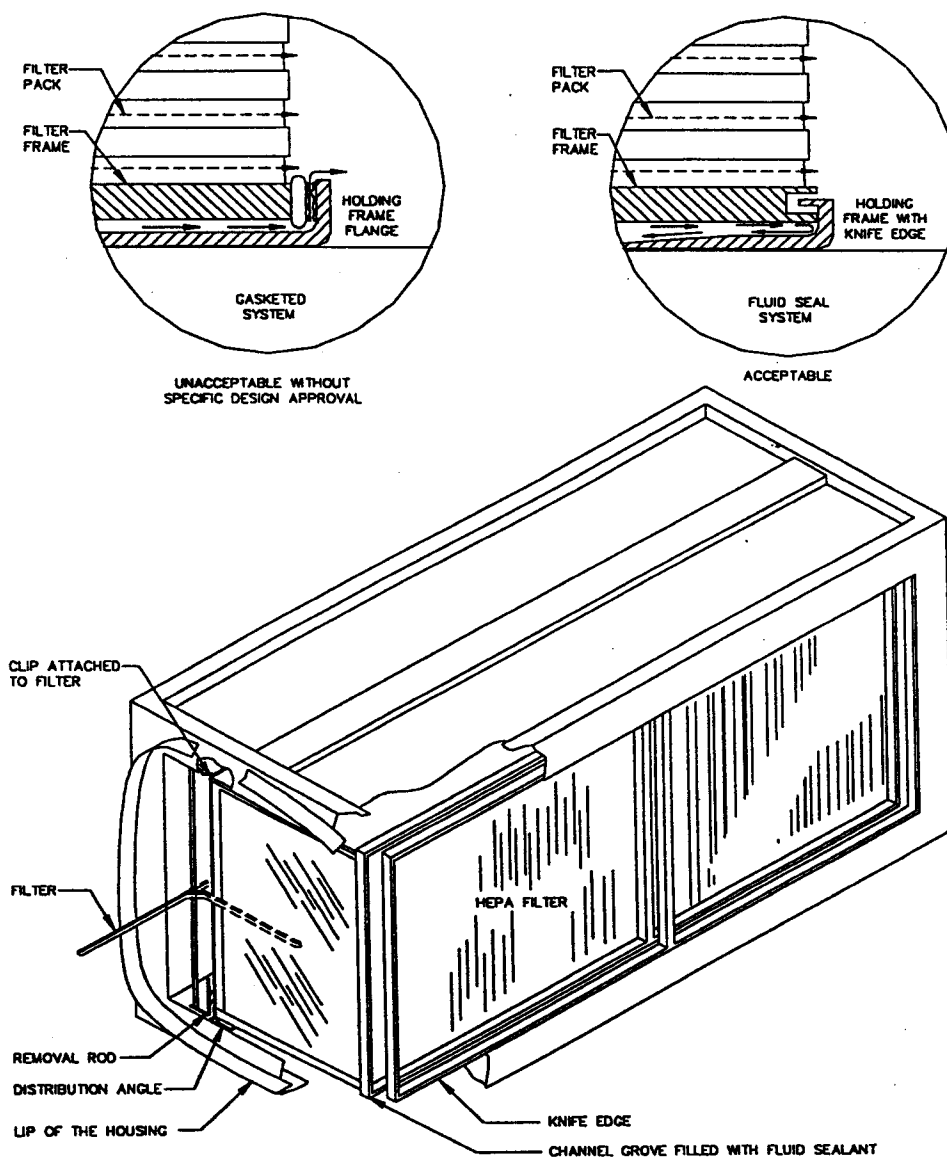


Figure 1554-1. HEPA Filter Housing.

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## 1560-1 CODES AND STANDARDS

### 1.1 Applicable Codes and Standards

- AES 0100-1, Codes and Standards

### 1.2 Referenced Codes and Standards

- ASME Boiler and Pressure Vessel Code
- ACGIH Manual, Threshold Limit Values for Chemical Substances and Physical Agents
- ANSI/NB-23, National Board Inspection Code

## 1560-2 GENERAL

- 2.1 Sufficient separation shall be provided in equipment layouts to facilitate removal, permit maintenance, and meet nuclear criticality requirements when applicable. Whenever redundancy is a requirement, sufficient separation, barrier walls, or other means shall be employed so that both systems or items of equipment cannot be damaged by a single accident.
- 2.2 The potential for fire resulting from the use of flammable fluids or the use of flammable materials for lubrication or cooling of equipment and components shall be considered in the design.
- 2.3 Prevention of plugging and the clearing of plugs when they occur shall be considered during design of process equipment. Maintenance shall be a primary consideration in the design of mechanical equipment. Components shall be designed to minimize exposure of maintenance personnel to radiation during cleanup and repair.
- 2.4 Equipment shall be designed so that pockets or traps are eliminated and equipment can be flushed and drained, except when loop seals are required.
- 2.5 Occupational noise exposure to continuous noise shall not exceed the limits prescribed in the current ACGIH Manual. In no case shall impact noise levels in excess of 140 dB be permitted.
- 2.6 In general, equipment noise shall not present an occupational health hazard, nor cause objectionable interference with normal conversation in areas such as offices, conference rooms, control rooms, laboratories, etc. Control of equipment noise shall be achieved by such methods as proper arrangement of facilities, selection of equipment with low noise level, isolation of equipment vibration, acoustical treatment, use of lower equipment speeds and system velocities, elimination of direct sound paths, etc
- 2.7 Vibration and other dynamic forces developed by mechanical equipment shall be isolated so as not to be transmitted to other parts of a system or adjoining architectural and structural members. Such methods as isolating equipment foundations from adjoining floor slabs, mounting equipment on vibration dampeners, and the use of flexible joints for equipment connections, shall be employed to achieve the desired isolation.
- 2.8 All boilers and pressure vessels shall be designed, fabricated, tested, and inspected in accordance with the ASME Code for the service intended and with the specific project design criteria. When purchased, the pressure vessel shall bear the appropriate

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ASME stamp of an authorized fabricator. Specifications shall require that vendor data include copies (3 minimum) of the Manufacturer's ASME Data Report indicating compliance with ASME Code requirements. This applies to all shop and field assembled boilers and coded pressure vessels installed at INEEL. All repairs and modifications made to stamped components shall be performed in accordance with appropriate codes and standards such as ANSI/NB-23 so as to maintain the validity of the stamp.

- 2.9 In the development of design criteria, where additional or special needs are identified beyond that which is standard and covered in existing codes and where new technology and special unproven processes are to be employed, the PM shall ensure that sufficient studies and pilot testing are performed. These studies and tests are to be performed by or under the direction of the OC to establish acceptability and appropriate use of the materials as approved by the OC and ID. The AE shall specify these proven and/or tested materials as a requirement within this scope of work. If additional studies and/or testing is required to determine the acceptability of materials, these shall be specifically and clearly stated by the OC and included in the AE scope of work. In either case, approval of all materials selection shall rest with the OC and ID.

## **1560-3 NUCLEAR SYSTEMS**

- 3.1 Specifications for specialized or engineered equipment not manufactured as standard production items, shall set forth minimum requirements (as established by the design criteria or as otherwise directed) for the quality assurance of materials and fabrication to ensure conformance with specified requirements. Quality assurance shall include such requirements as submittal of certified material test reports, maintenance of material traceability, certification of conformance with applicable codes and standards, certified qualification of craftsmen, nondestructive material testing, inspection of fabrication by customer's inspectors or quality assurance personnel, etc. Specifications for specialized or engineered equipment shall also require testing of the finished product in the fabricator's shop to verify conformance with the specification. This includes testing for such characteristics as strength, leakage, vibration, distortion, capacity, efficiency, resistance to flow, etc. The results of this testing shall be in writing in enough detail to clearly verify that all requirements in the specifications have been satisfied.
- 3.2 All specifications shall include requirements for cleaning, packaging, shipping, handling, and storage of nuclear components. Nuclear reactors and nuclear containment systems, including piping and equipment installations, shall be designed in accordance with the seismic design requirements for the system classification, unless more stringent requirements are imposed by the design criteria. This applies to all suspended or wall-mounted items, as well as floor, ground, or pedestal-mounted items where failure of support or containment would constitute a significant health or safety hazard. Nuclear material handling and storage facilities, such as fuel handling cranes, transfer equipment, storage pools, etc., shall be designed to retain structural integrity throughout the seismic disturbance.
- 3.3 Notches, cracks, crevices, or rough surfaces which might retain radioactive materials shall be avoided in the design of process equipment. Moving parts shall be designed to pass the materials to be handled without clogging or otherwise preventing proper operation.

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- 3.4 Pumping and Pressurization Waste handling tanks and systems shall be designed to take advantage of gravity flow or the use of jets, airlifts, or similar equipment to reduce potential maintenance problems associated with mechanical equipment.



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ENGINEERING STANDARDS****TITLE: STACK DESIGN CRITERIA**  
**DATE: January 1997** **SECTION: 1589****1589-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

C AES 0100-1, Codes and Standards

**1.2 Referenced Codes and Standards**

C 40 CFR 61, National Emission Standards for Hazardous Air Pollutants

**1589-2. GENERAL**

**2.1** Stacks shall be designed to achieve good dispersion of released material. Consult the ASHRAE Handbooks for required data. If required by the design criteria, a redundant sampling and monitoring system shall be provided to determine the chemical and radioactive content of the gaseous effluent. The stack design and location shall also include evaluation of natural phenomena to be withstood and safety considerations for the possible event of stack structural failure.

**2.2** Stack height shall be designed according to 40 CFR 61. The nozzle angle shall be no greater than 15 degrees from the vertical to minimize back pressure and turbulence. Consideration shall be given to designing the stack to draw and maintain the facility under a slight vacuum without mechanical assistance.

**2.3** All new ICPP stacks shall be designed to incorporate the following criteria:

- (a) Each stack less than 2 feet ID shall be fitted with one sample port. This port shall be 4 inches ID and made of the same material as the stack (or compatible substitute). The port shall extend into the stack no more than 1 inch and shall extend out from the outer wall of the stack a minimum of 3 inches. The port shall be placed at least 8 stack diameters above the inlet or any obstruction and at least 2 stack diameters below the outlet. This port shall be capped with a blind flange when not being used for sampling.
- (b) Each stack more than 2 feet ID but less than 5 feet ID shall be fitted with 2 ports. These ports shall be at the same height on the stack, 90° apart, and shall conform to the criteria stated in the previous paragraph. In addition, a sampling platform shall be constructed around the stack, giving safe access to an unobstructed work area near each port. This platform must be at least 30 inches wide with a 36-inch high guard rail. A clearance zone of at least 6 feet shall extend out from the stack in the area of each port to allow for handling, maintenance, and operation of sampling equipment. 120 Vac 60 Hz electrical power shall be available in the sampling area.
- (c) Each stack greater than 5 ft ID shall be fitted with 4 ports, 90° apart, at the same height on the stack. All of the criteria stated in the previous paragraph must also be met.

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## 1600-1. CODES, STANDARDS, AND GUIDES

### 1.1 Applicable Codes and Standards

- C AES 0100-1, Codes and Standards
- C AES 112-1, Codes and Standards
- C AES 180-1, Codes and Standards (as applicable to security systems)
- C ANSI/NFPA 70 National Electric Code (NEC)
- C ANSI-C2, National Electrical Safety Code (NESC)
- C NEMA Standards
- C UL Standards and Product Directories
- C FM Approval Guide, and FM Loss Prevention Data Sheets
- C ISA Electrical Guide for Control Centers, Recommended Practice RP-60

### 1.2 Referenced Codes and Standards

- C AES 111-1, Codes and Standards
- C ANSI/IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
- C ANSI/IEEE 493, Recommended Practice for Design of Reliable Industrial and Commercial Power Systems
- C ICEA Standards
- C NFPA 780, Lightning Protection Code

## 1600-2. GENERAL

- 2.1 **Hazard Classification and Equipment Suitability** Hazard classifications shall be assigned in accordance with NEC or NFPA requirements unless otherwise stated in the Design Criteria. Should the AE question the particular application, his concerns should be brought to the attention of DOE-ID or the OC.
- 2.2 **Equipment Ratings** Fault duty (interrupting), Close and Latch, and B.I.L. ratings shall be given in the project Design Criteria. If not provided the AE shall contact the OC to obtain these ratings early in the course of his design. All electrical equipment shall be rated for operation at an elevation of 5,000 ft above sea level.

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- 2.3 **Seismic Disturbances** Seismic design requirements shall be in accordance with the Design Criteria or Section 0111-5.
- 2.4 **PCB** New electrical equipment shall not contain PCB. When equipment containing PCB is encountered during modification of an existing system, the AE shall notify the OC who shall make provision for its disposal.
- 2.5 **Retrofit** The extent of the modification will be specified in the project design criteria. Each addition or renovation will be evaluated on an individual basis. The extent of electrical retrofit needed shall be based on code requirements, cost the acceptable risk and the projected use of the upgraded facility as identified in the project design criteria.
- 2.6 **Fire Stops** Where cable or raceway systems penetrate firewalls, floors, or ceilings, fire stops of a fire resistant rating equivalent to the rating of the wall shall be installed. Fire stop material in contact with cable shall have been tested by a recognized testing agency to determine its effect on cable jacketing and ampacity. Conduits larger than 4 in. passing vertically through a fire barrier shall also contain interior fire stops such as Crouse-Hinds EYS fittings with approved sealant such as Chico X compound.
- 2.7 **Locking Devices** As required by 29 CFR 1910.147, whenever applicable equipment or systems are replaced or undergo a major modification or upgrade, the means to accept a lockout device on energy isolating devices shall be included as part of the replacement. Equipment or systems that have lockout devices as standard accessories shall be specified with those devices. Electrical equipment shall have locking devices as required by the NESC.

### 1600-3. SYSTEMS AND VOLTAGE

- 3.1 **Power System Reliability** Power system reliability consideration shall comply with IEEE 493 to ensure continual supply to systems and equipment designated by project design criteria as critical. The need for multiple transformer-switchgear service equipment, to ensure power supply continuity within the facility during scheduled or emergency equipment outages, should also be considered.
- 3.2 **Power Quality Requirements** Adverse effects of voltage level variations, transients, and frequency variations on equipment operation shall be minimized. Sensitive electrical equipment should be isolated as needed for protection. Uninterruptible power systems, motor-generator sets, or power conditioners may be used for isolation.
- 3.3 **System Protection** System protection shall comply with IEEE 242.
- 3.4 **Primary Voltage** Where available, the primary voltage for distribution of normal electrical energy in all INEL plants shall be 12.47, 13.8 or 4.16 kV, nominal, except where otherwise specified. This shall be the highest voltage obtainable within the plant areas without transformation, and shall be the secondary voltage of primary electrical supply substations.
- 3.5 **Distribution Voltages** Distribution transformer secondaries (600 V and less) shall be solidly grounded. Any condition which produces a non-linear current voltage relationship shall be accounted for in the design by accepted methods for the situation. Transformer requirements for non-linear loads shall have a K-factor rating in accordance with

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ANSI/C57.110 using the UL verification method. Voltages selected for internal power distribution should be the highest level consistent with the types of loads to be served. A 480/277 V system will generally be the best selection for most facilities, particularly where a significant portion of the facility load will be motor load. With this system, small appliance loads, convenience outlets, and other loads requiring lower voltage supply are served from dry-type 480 V to 208/120 V step down transformers. Lighting loads will usually be supplied at 277 V. A 208/120 V system may be the most economical method for smaller facilities or where 120 V equipment represents the major portion of the load and the average length of feeders is less than 200 ft. For facilities having loads of 75 kVA or less and no requirements for three-phase service, the conventional 240/120 V single-phase internal distribution system should be used.

- 3.6 Circuits for supplying motors 250 hp and larger and for supplying energy to major load centers within the plants should be considered for design at 2.4 kV nominal or higher, three-phase, except as may otherwise be specifically required in the project design criteria. Electric fire pump motors are excepted from this requirement and shall use 480 V, three-phase, UL labelled fire pump controllers and equipment.
- 3.7 In general, circuits for supplying motors 1/2 hp to 100 hp and for supplying power outlet receptacles in operational areas shall be designed for 480 V, three-phase. Motors above 1/2 hp may operate on 120 V, 208V, or 240 V single-phase, when furnished as part of a regularly manufactured assembly.
- 3.8 Circuits for supplying motors less than 1/2 hp shall be designed for 120 V, two-wire, single phase; 120/240 V nominal, three-wire, single-phase, or 208/120 V, four wire, three-phase supply.
- 3.9 Circuits of 240 V and higher used for interior lighting or baseboard or similar heating systems shall be switched by circuit breakers only, unless switched by a contactor. The control circuit voltage should be 24 or 120 V and shall be derived from the branch circuit it controls. The use of higher than 120 V as control voltage will be evaluated on an individual basis and will not be considered unless only qualified personnel will maintain the equipment.

**1600-4. LIGHTNING PROTECTION**

- 4.1 Lightning protection systems shall be designed and installed in accordance with the latest issue of NFPA 780. Building trim, stairs, ladders, railings, structures, stacks, siding, etc., of conducting material shall be continuous and shall be bonded to the building ground grid. The down conductor grounding wire shall be covered to prevent staining of exterior building surfaces. Conducting piping, ducting, etc., shall also be continuous and bonded to the building ground. Perform risk assessment in accordance with NFPA 780. For "Severe" to "Moderate" risk lightning protection should be installed. Interior or underground electrical lines or equipment directly connected to overhead lines shall also receive lightning or surge arrestor protection.

**1600-5. TESTS AND COORDINATION**

- 5.1 General Tests of completed installation should include such electrical tests as high potential, continuity, insulation resistance, ground resistance, load, and function tests deemed

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necessary to properly show the adequacy of the particular installation. Acceptable values for conductors shall comply with applicable ICEA standards, except that signal and control cables rated 600 V or less shall have an insulation resistance value of  $10 \times 10^6$  ohms or greater when tested with a 500 V megohmmeter.

- 5.2 Medium and High Voltage Systems** Testing of medium and high voltage conductors, transformers, substation equipment, and associated equipment to be placed on these systems shall be observed and approved by INEL Power Management organization.
- 5.3** All protective relaying and device coordination for medium and high voltage systems shall be reviewed by INEL Power Management organization.

## 1600-6. DEACTIVATION OF ELECTRICAL EQUIPMENT

- 6.1 General** Physical removal of electrical equipment shall occur when the conduit or equipment is disconnected or permanently taken out of service. Demolition or red line drawings showing the changes should be turned over to the facility for as-building. Unused electrical equipment should only be left in place if one or more of the following conditions exist:
- C the system is in a radiological contaminated area and ALARA precludes the removal.
  - C the removal requires the demolition of other structures or equipment that are still in use. An example is conduit embedded in walls or ductbanks.
  - C the cost of removal is excessive due to hazards, construction methods, or restricted access.
  - C an immediate future need is identified.
- 6.2 Abandonment of Raceways** Conduits and other raceways should be removed unless justified in accordance with the conditions of 6.1 above. Removal of existing "spare" conduits is not required. Pull ropes or other means of installing conductors shall be provided if old conductors are removed. Abandoned conduits shall be capped, old labels removed and labeled as indicated hereafter.
- 6.3 Labeling/Tagging** All abandoned conduit and equipment shall be labeled identifying its status. For example:
- C raceway "origin" or "destination"
  - C "CONTAMINATED"
  - C "ABANDONED"
  - C "SPARE"
  - C for equipment to be reused, "Work Order No. XXX" or "Job No. XXX"

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**1630-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- AES 1600-1.1, Applicable Codes and Standards

**1.2 Referenced Codes and Standards**

- ANSI/IEEE C37 series, Circuit Breakers, Switchgear, Relays, Substations and Fuses
- ANSI/IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
- ANSI/IEEE 399, Recommended Practice for Power Systems Analysis
- ANSI/IEEE 493, Recommended Practice for Design of Reliable Industrial and Commercial Power Systems
- REA Bulletin 50-1 Standard T-805B
- REA Bulletin 50-3 Standard D-804
- REA Bulletin 50-6 Standard D-806
- Factory Mutual Loss Prevention Data Sheet 5.4.

**1630-2. GENERAL**

- 2.1** Exterior electrical systems shall be designed and constructed with regard to existing electrical system construction in adjacent areas. Relaying shall comply with IEEE 242, and switchgear shall comply with IEEE C37 series.
- 2.2** Load Requirements Demand and diversity factors shall comply with NFPA 70. Electrical service quality and reliability shall be considered in conformance with IEEE 493 to ensure that they meet the load requirements. Where loads require a high degree of voltage and frequency stability, the available short-circuit current (AIC) at the service connection and the stability of the supplying utility system shall be considered to ensure adequate power supply.
- 2.3** Power Factor An overall power factor of not less than 85 percent shall be achieved. Switched capacitor banks shall be used only when necessary to prevent over voltages during off-peak hours during low power consumption. Starting capacitors shall be located as near to the loads as practical. Starting capacitors shall be switched simultaneously with load.
- 2.4** Redundancy Facilities designated as critical by the Project Design Criteria shall be served by dedicated redundant circuits. The two services should be separated by a 4-hour fire-rated barrier and should be served from separate sources. In lieu of providing two separate services, a single service may be provided when the reliability of the single service prove adequate when considered in conformance with IEEE 399 and IEEE 493.

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- 2.5 **Metering** Electrical energy (kWh) metering shall be furnished at each substation of 500 kVA or larger capacity. Demand (kW) metering shall be furnished as required for load management purposes.

**1630-3. OVERHEAD LINES**

- 3.1 **General** Joint use of pole lines for electrical, alarm, and communication conductors shall be made wherever possible; alarm lines shall generally be the lowest lines on the structure. Pole lines, 601 V and higher rated, shall comply with NEC Article 710, NESC and shall be generally designed in accordance with the recommendations of the Rural Electrification Administration (REA) Bulletins listed above. Lines shall be a Grade B, Class 2 construction, minimum, or equivalent. Poles shall be pressure treated in accordance with ANSI 05.1. Poles may also be protected with the use of solid wood preservative boron rods containing disodium octoborate to replace boron lost from the poles. Federal Specification TT-W-00571 J, or latest edition, shall apply. For lines rated 15 kV and lower, details of construction shall comply with REA Form 804. Lines rated 600 V or less shall follow the above requirements where appropriate and shall specifically meet the strength, size, and treatment requirements.
- 3.2 **Minimum Clearance** Clearance shall assume that all areas are accessible to truck traffic unless physically barriered to preclude such traffic. Clearances over major access routes shall comply with NESC. Minimum vertical clearances in traffic corridors should be provided in the Design Criteria. In areas frequented by truck traffic with loads of greater than ordinary height, consideration shall be given to burying the line.
- 3.3 **Design Criteria for Overhead Pole Lines at the INEEL Site** The environmental conditions to be considered in the design of overhead transmission, distribution, and communication lines are as follows:

Loading District	Heavy
Extreme Wind Loading	16psf
Ice Loading	0.50 in.
Design Low Temperature	-50EF
Design High Temperature	100EF

3.4 **High Voltage Termination on Pole Lines**

- (a) Cutouts shall be 15 kV loadbreak.
- (b) Termination of 5 kV to 25 kV rated lines shall use termination kits which meet IEEE 48 Class I standards.

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- 4.1 In congested areas, where required for safety or conformance with facility practice, power distribution circuits shall be placed underground. Underground cables and ducts shall be suitably identified. All circuits for power, telephone, alarms, etc., to be placed underground in areas outside of buildings in plant areas shall be run in conduit in concrete encasements (Duct Bank). In general, the minimum size conduit shall be 2 in., with the exception of simple runs of conduit to dedicated equipment. These shall be sized for the applications, with a 3/4 in. minimum. All concrete used to encase underground electrical duct banks shall be colored red. See the appropriate drawing listed in Appendix D for further details.
- 4.2 Underground runs for power, telephone, alarms, etc., outside of plant areas, for temporary installations, or for areas where future excavation will be minimal, may be direct burial cable or moisture-proof cable installed in RGS conduit. At the INTEC buried RGS shall be either cathodically protected or be PVC coated RGS. All conduit bends over 30 degrees shall be rigid steel conduit. Splices in direct-burial cable shall be made with splice kits that provide an approved waterproof splice.
- 4.3 Underground installations shall be installed and buried to depths specified in NEC and shall have a locator ribbon installed. See Section 0200 2.6 for locator ribbon requirements. Cable route marking signs showing the depth of burial shall be installed at 300 ft intervals or within sight distance along the route. Non-marking of cable routes may be allowed if directed in the project Design Criteria under the following special conditions:
- (a) security
  - (b) sensitive control for reactors
  - (c) where marked routes are inappropriate for similar reasons.
- 4.4 All spare ducts and conduits shall contain a pull rope to facilitate future pulling.
- 4.5 Underground duct or utility corridor that penetrate security barriers shall provide the same resistance as the barrier. This provision applies when the free area within the duct run or corridor is more than 96 square inches in area and over six inches in smallest dimension.

**1630-5. MANHOLES**

- 5.1 The AE shall use standard telephone and electrical manholes shown on drawings listed in Appendix D. Cables shall be racked. Racks, ladders, and other exposed conducting material shall be bonded together and grounded. Ladders shall be permanently affixed (not portable) and so installed that



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contact with cables or cable supports is not necessary in use. Cables of different voltage classes shall be separated to the maximum extent. Communication cables shall not be located in manholes with power cables unless required by existing conditions, separated by a physical barrier with a dielectric strength equal to the highest voltage in the manhole, and permitted by the design criteria. Communication cables associated with the power cables, such as SCADA shall be allowed. Pulling eyes shall be installed in each manhole.

**1630-6. TRANSFORMER INSTALLATIONS**

- 6.1** All transformers shall be installed per the requirements of FM Loss Prevention Data Sheet 5-4 and the NEC.
- 6.2** All ground level oil filled transformers, switches, or electrical equipment containing more than 50 gal of electrical insulating oil shall have containment installed to minimize spill remediation. The containment shall be concrete or other evaluated material meeting NEC requirements.

**1630-7. SWITCHYARDS, TRANSFORMER YARDS, SUBSTATIONS**

- 7.1** See Section 0200-3 Outdoor Substations.

**1639-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 1600-1.1, Applicable Codes and Standards

**1.2 Referenced Codes and Standards**

- C ANSI/IEEE 80, Safety in AC Substation Grounding
- C ANSI/IEEE 142, Grounding of Industrial and Commercial Power Systems

**1639-2. GENERAL**

- 2.1 Grounding systems shall comply with the NEC and IEEE 142. A separate ground conductor shall be used for each circuit. Raceway systems shall not be used as ground path. Ground characteristics at the INEL are such that supplemental cable for ground grid or loops and attachment to well casings is required to satisfactorily reduce ground resistance.
- 2.2 All underground metallic piping, all properly grounded building structural steel and rebar, all driven ground rods or ground wells, duct bank grounds, feeder grounds, and all metallic conduit and ground loop cables shall be tied into the building grounding electrode system in accordance with section 250 of the NEC. The building grounding electrode system (bus) shall be located in the service equipment or adjacent to the service equipment. Grounding electrode conductors, ground rings, and downcomers shall not be less than No. 2 AWG copper or equivalent in conductivity. Interconnecting conductors shall not be less than No. 6 AWG copper or equivalent in conductivity. All underground splices and taps in bare conductors shall be by means of exothermic welded connections or nonreversible compression connections listed for the use.

**1639-3. SUBSTATION AND SWITCHING STATION GROUNDING**

- 3.1 Substation and switching station grounding shall comply with IEEE 80.

**1639-4. FENCE GROUNDING**

- 4.1 Permanent fence grounding shall comply with the NESC. All permanent metallic fences crossed by overhead power lines shall be grounded to the plant grounding system at every third post for a distance of 100 ft from the crossing and at the posts on both ends of all gates by use of suitable grounding jumpers. All gates shall be made continuous with the adjacent fence by the use of a direct buried copper conductor whether they are crossed by power lines or not. Gate posts shall be bonded to gates with a flexible copper conductor. 138 kV substation fences shall not be grounded to area grounding systems but shall be grounded to a separate grounding system which shall be provided for the substation grounding requirements. See the appropriate drawing listed in Appendix D for more detailed requirements.

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**1639-5. ISOLATED GROUND SYSTEMS**

- 5.1 General** Isolated ground system may be required to meet special instrumentation or other equipment needs. Such ground systems shall be clearly identified, protected against improper usage, and installed in accordance with the NEC.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: SERVICE AND DISTRIBUTION EQUIPMENT**  
**DATE: January 1997** **SECTION: 1640****1640-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 1600-1.1, Applicable Codes and Standards

**1.2 Referenced Codes and Standards**

- C AES 0112, Energy Conservation

**1640-2. SERVICE AND DISTRIBUTION EQUIPMENT**

**2.1 Main Service** General purpose disconnects shall not be permitted.

**2.2 Metering** See Section 0112 for service and distribution metering requirements.

**2.3** 200 amp loadbreak elbows or 600 amp deadbreak connectors shall be used for medium voltage applications. Equipment using these devices shall be provided with parking stands to accommodate standoff bushings for parking elbows or 600 amp deadbreak connectors.

**2.4** Where loadbreak elbows or switches are located in vaults, provisions shall be made for operation of these devices from ground level. In the case of a vault, if there is a stairway type emergency exit with crash hardware, emergency lighting, and a 15 ft clear area to the exit, in front of any device that is to be operated with a 8 ft hot stick then these devices may be operated within the vault. The stairway shall be protected from exposure to fire. Non-loadbreak elbows shall not be used in manholes.

**2.5 Panelboards and Circuit Breakers**

- (a) Low voltage panelboards for lighting and power distribution should be of the dead front type in NEMA 1 general purpose enclosures, or in higher NEMA-rated enclosures as required for the conditions to be encountered.
- (b) Branch circuit breakers will be of the bolt-on or plug-on, thermal magnetic, molded case, overload and short circuit type, with a minimum trip rating of 20 amp. The use of molded case circuit breakers in panelboards should be limited to no greater than the 1200 amp trip-rating size. Circuit breakers shall be full space per pole minimum. Multi-pole circuit breakers shall be common trip.
- (c) Vertically mounted circuit breakers or switches shall, in general, have the load terminals at the bottom of the device and shall be closed when the handle is in the up position.

**2.6** Where receptacles are located more than 50 ft from the panelboard, it is preferable to use receptacles with built-in GFCIs. Where it is possible that ground fault current, considering the cord-device combination to be connected to the circuit, will approach 4 milliamperes, such as circuits supplying cord connected underwater lighting, isolation transformers shall

be used. Such transformers shall have ungrounded secondaries, and the secondary to ground impedance shall exceed  $10 \times 10^6$  ohms after installation and connection of the branch circuit wiring and receptacles. The most common are kitchen areas, restrooms and showers, laboratory areas, and other areas where installations of sinks, plumbing, laboratory benches, workbenches, and so forth, provide exposed electrical ground points and surfaces; and particularly in basement areas and wherever moist or wet conditions exist within buildings or in adjacent outside areas.

## 2.7 Motor Control Centers

- (a) Motor Control Center control power schemes shall be fused, 120 V maximum, grounded systems. Control transformers shall be sized for 125% of the design connected load. Motor control centers should be NEMA Class II, Type C. Bus shall be barriered from wireway, conduit, and utilization spaces. Withstand rating of the bus shall be the greater of 42,000 amps symmetrical or as calculated. All bus material shall be tinned or silver-plated copper or aluminum for phase buss. Ground bus shall be copper only.
- (b) The Design Criteria may require that ground fault circuit breakers, if available, be used in lieu of the thermomagnetic type. Breakers shall be rated greater than 20,000 amps symmetrical or as calculated.
- (c) Motor Circuit Protectors (MCP)s may be used where they are a part of a UL approved assembly.
- (d) Deep-Well Pumps should be evaluated for time delay relays to be included in their starting equipment.

## 2.8 Harmonics

- (a) New electrical panels and services installed in new or existing facilities shall be designed to accommodate the load caused from harmonic currents. Harmonic currents can be generated from office equipment, lighting ballasts, variable frequency drives, motor speed controllers, Uninterruptible Power Systems (UPSs), and other electronic of frequency modifying equipment. The harmonic currents generated cause heating of the neutral bus or service conductor. Over-sizing of the neutral conductor and panel bus to 200% shall be evaluated. Increasing the size of a transformer shall be evaluated based on the harmonic contribution of equipment in the facility.
- (b) Filtered, isolated, and high K factor transformer shall be evaluated for use to reduce harmonics currents in the power distribution system. Selection of low harmonic producing equipment shall be evaluated to minimize the effect to the power distribution system.

- 2.9 Surge Suppression The use of a transient voltage surge suppressor system on main and distribution power equipment shall be evaluated for facilities or power systems serving electronic loads.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: WIRING METHODS AND MATERIALS**  
**DATE: January 1997 SECTION: 1641****1641-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- c AES 0100-1, Codes and Standards
- c AES 1600-1.1, Applicable Codes and Standards

**1.2 Referenced Codes and Standards**

- c ANSI/IEEE 383, Type Test of Class 1E Electrical Cables, Field Splices, and Connections for Nuclear Power Generating Stations
- c ANSI/IEEE 576, Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in the Petroleum and Chemical Industry

**1641-2. WIRING METHODS AND MATERIALS****2.1 Wiring Methods**

- (a) The following methods for wiring are not permitted:

- "Open Wiring on Insulators" (NEC Article 320)
- "Concealed Knob-and-Tube Wiring" (NEC Article 324)
- "Nonmetallic-Sheathed Cable-Types NM and NMC" (NEC Article 336)
- "Service-Entrance Cable-Types SE and USE" (NEC Article 338)
- "Underground Feeder and Branch--Circuit Cable-Type UF" (NEC Article 339)
- "Edison Circuits" or "Multiwire Branch Circuits" (NEC 210-4)

- (b) The neutral conductor for electric discharge lighting and for data processing and other similar equipment shall be sized in accordance with the NEC. Calculations should include harmonic current.

**2.2 Wiring Materials**

- (a) Conductors for interior electrical systems shall be copper.
- (b) Conductors for power and lighting branch circuits shall be No. 12 AWG, minimum, except flexible cords and flexible cable which shall be No. 16 AWG, minimum.
- (c) Conductors for control circuits should be No. 14 AWG, minimum, except that crane and elevator circuits, remote-control circuits, signalling circuits, power limited circuits, fire protection signalling systems, instrumentation, and communication circuits may be sized in accordance with NEC Articles 610, 620, 725, 760, and 800.
- (d) Termination methods for unusual conductor constructions (such as unusual size, other than concentric stranding, high flexibility) shall receive special consideration and shall be specified in all documents relating to the conductors.

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- (e) Solid conductor wire shall not be terminated in crimp type terminations or devices.
- (f) Medium and High voltage (>1000 V) conductors, other than base aerial lines, shall be prominently marked to indicate their phase, voltage, and a unique identity designating the other end of that particular conductor.

**2.3 Color Coding and Marking of Wire and Cable** All wire and cable shall be marked except aerial bare or covered single conductors. Cables shall be marked with a circuit or cable number. All single conductor wire and conductors of cables shall be marked with a wire number and circuit number. Where a definite color coding is used, wire number marking shall not be required except where two or more circuits are in one cable, in which case each wire shall be marked with a circuit number.

For branch circuits and all interior supply side circuits, the color code shall be as follows:

**(a) For 240/120 V System: (Single Phase)**

Hot--Black  
Hot--Red  
Neutral--White  
Ground--Green or bare

**(b) For 480/277 V System: (3 Phase)**

Phase A--Yellow  
Phase B--Orange  
Phase C--Brown  
Neutral--Gray  
Ground--Green or bare

**(c) For 208/120 V System: (3 Phase)**

Phase A--Black  
Phase B--Red  
Phase C--Blue  
Neutral--White  
Ground--Green or bare

**(d) For 208 V System: (Single Phase)**

Phase A--Red  
Phase B--Blue  
Neutral--White  
Ground--Green or bare

**2.4** Wire and cable markers shall be located at origin and destination. All wire and cable shall be marked with a cable or circuit label that will identify the origin and destination of that wire or cable.

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- 2.5 Wire markers shall be within 3 in. of a termination or splice. Cable markers shall be within 3 in. of the spread, cable end, penetration, or box exit.
- 2.6 No cable numbering shall be required in small rooms, buildings, vaults, etc., where the panelboards and loads are in general view, and the function of the cable is obvious. However, wire numbers may still be required. Raceways containing a single cable shall not require the contained cable to be marked if the raceway marking designates the cable. Wire numbers may still be required.
- 2.7 For all conductor sizes, green, gray, or white colors are reserved exclusively for grounding and grounded conductors, except as noted in this section. These colors shall not be used in any way to identify an ungrounded conductor. Green shall only be used to identify a grounding conductor. Gray or white, as required by the appropriate color code, shall be used only for the grounded or neutral conductor identification. Painting, taping, or other alteration of the color of green, white, or gray colored conductors is prohibited.
- 2.8 Multiconductor cables used for low-voltage circuits as defined in NEC Article 725 will not be restricted in the use of green, gray, or white color-coded insulated conductors whether these colors are used as the main color, in pairs, or as tracers.
- 2.9 **Installation**
- (a) Multiconductor cable shall be UL labeled and shall meet the flame test requirements of IEEE 383. These requirements shall also apply to communication centers, operational control centers, computer/data processing rooms, and similar installations.
  - (b) Bare energized electrical conductors in interior systems shall be barriered or guarded to prevent contact by personnel or conducting objects being carried or used by personnel. Conduit shall not be used as a grounding conductor for equipment or receptacles.
  - (c) Installation instructions in the specifications shall require that the installation of any cables requiring mechanical assistance be performed in accordance with ANSI/IEEE standard 576, IEEE recommended practice for installation, termination, and testing of insulated power cables as used in the petroleum and chemical industry. Use of a dynamometer may be recommended. ANSI/IEEE Standard 576 shall be used in designing cable layouts to avoid installation problems.



**1642-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- AES 0100-1, Codes and Standards
- AES 1600, Electrical Design

**1642-2. RACEWAYS****2.1 Selection and installation of raceways elbows, couplings, and other fittings shall comply with the project Design Criteria and, the following restrictions:**

- (a) EMT shall be used in lieu of rigid metal conduit or IMC, except where the conduit would be subject to severe physical damage, such as below 8 ft 0 in. elevation in areas where forklifts or other vehicles operate, or corrosion damage, or where it is embedded in concrete or buried. Neither aluminum conduit nor EMT shall be embedded in concrete or buried in earth.
- (b) Polyvinyl chloride (PVC) shall be used where practical except above grade. PVC conduit, fittings, exposed jacketing or tapes may not be used within 6 in. of high temperature stainless steel piping.
- (c) Conduits embedded in structural concrete (walls and floors) should be avoided. When it is necessary to embed conduits in concrete the following guidelines should be followed:
  - Place conduits in the middle third of slabs or walls except where reinforcement prohibits it.
  - Conduit should not exceed one-third slab thickness in O.D.
  - Conduit should not be spaced closer than three diameters except at cabinet locations
  - Conduit should be installed so that no curved portion of bends extends above the finished slab.
  - Embedded raceways should have 12 in. minimum clearance from fire box floors and similar heat sources and should not be directly under the fire box.
  - Coordinate conduit sizes and locations with the structural designer.
- (d) The wiring method known as "Nonmetallic Extensions" (NEC Article 342), "Surface Raceways" (NEC Article 352), and "Multi-outlet Assembly" (NEC Article 353) shall not be wall or partition mounted at elevations less than 4 ft above floor level unless protected from contact by moving furniture, benches, etc. by running boards or the building finish.

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- (e) Electrical raceways shall not be routed parallel to pipes whose temperature at the extension surface will normally exceed 30° C, unless the spacing between the pipes and raceways exceeds 6 in. Coordinate raceway locations with mechanical designer when using joint spaces for runs.
- (f) Dual power source circuits for vital equipment shall be separately routed, or installed in metal enclosed raceways separated by 2 in. or more, so that a common single failure would not be likely to cause damage to the separate circuits. Where it is not possible to route circuits in enclosed raceways, they may be routed in separate open raceways, provided the raceways are separated by 2 ft minimum.
- (g) Separate dedicated raceways shall be provided for each of the following: Criticality Alarm, Evacuation Alarm Control, Evacuation Alarm Power, Security Alarm Control, Security Alarm Power, Emergency Power, Plant Protection Systems, commercial Telephone, and any other electrical systems as specified by the NEC. Circuits carrying current at frequencies other than 60 Hz shall be considered for installation in separate dedicated raceways.
- (h) Where cable or raceway systems penetrate firewalls, floors, or ceilings, fire stops of a fire resistant rating equivalent of the rating of the wall shall be installed. Fire stop material in contact with cable shall have been tested by a recognized testing agency to determine its effect on cable jacketing and ampacity. Conduits larger than 4 in. in size passing vertically through a fire barrier shall also contain interior fire stops. Such stops shall not cause cable temperature increase above the rated temperature of the cable.

**1642-3. TRAY INSTALLATIONS**

- 3.1 Where stacking of cable trays is necessary, it is recommended that the trays have 24 in. minimum clearance. The trays should be stacked in the following order:
  - (a) Top Tray Power cable.
  - (b) Second Tray Control cable (120 V and higher) and any DC other than power cable. (May be combined with power cable, provided NEC requirements are met.)
  - (c) Third Tray Instrument cable (may be combined with power limited circuits or power control circuits, provided appropriate NEC requirements are met).
  - (d) Bottom Tray Power-Limited Circuits; Remote Control, Signaling and Power-Limited Circuits as defined by NEC Article 725, Section C; also power-limited circuits complying with NEC Article 760 or 800. While not desirable, these circuits may be run with non-power-limited circuits. However, they then lose their power-limited status and may not at any point in their run be considered as such.

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ENGINEERING STANDARDS****TITLE: RACEWAYS**  
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- 3.2 Cable trays that penetrate security barriers shall provide the same degree of penetration resistance as required by the barrier. This provision applies when the opening at the barrier is more than 96 inches in area and over 6 inches in smallest dimension and located less than:
- eighteen feet above uncontrolled ground, roofs, or ledges.
  - fourteen feet diagonally or directly opposite window, fire escapes, roofs, or other openings in uncontrolled buildings.
  - six feet from uncontrolled openings in the same barrier.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: RECEPTACLES AND OUTLETS**  
**DATE: January 1997** **SECTION: 1645****1645-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 1600-1.1, Applicable Codes and Standards

**1645-2. RECEPTACLES**

- 2.1** Receptacles shall comply with specification grade or better.
- 2.2** Receptacles for supplying 480 V power shall be of the three-wire, four-pole, female type, such as Crouse-Hinds Type ARE or approved equal. Mating plugs shall be three-wire, four pole, male type, such as Crouse-Hinds Type APJ, or approved equal. Each 480 V receptacle shall be readily accessible and shall be provided with a disconnect switch or other disconnecting means.
- 2.3** All receptacles for 480 V supply shall be connected for uniform phase rotation (Pin 1 Phases A, Pin 2 Phases B, Pin 3 Phases C).
- 2.4** Receptacles for supplying 240 V three-phase power to special portable apparatus shall be 3-pole, 4-wire grounding, female type, with NEMA 15R configuration. Mating plugs for such receptacles shall be matching, 3-pole, 4-wire grounding, male type, with NEMA 15P configuration.
- 2.5** Receptacles for supplying 240 V single-phase power to special portable apparatus shall be 2-pole, 3-wire female type with NEMA 6R configuration. Mating plugs shall be 2-pole, 3-wire male type with NEMA 6P configuration.
- 2.6** In general, it is not intended that 240 V, single or three-phase receptacles be installed at any location except as specifically required, justified, and approved in the project design criteria. Power for supplying 240 V receptacles may come from 120/240 V, three-wire lighting or receptacle circuits, and should be less than 30-amp rated circuits.
- 2.7** Special purpose receptacles or receptacles for any other voltage, frequency (other than 60 Hz), or phase arrangement shall be provided for that purpose, specific voltage, frequency, or phase arrangement so that plugs assigned to other purposes, voltages, frequencies, or phase arrangements cannot be inserted. Such special receptacle configurations shall be as provided in the project design criteria.
- 2.8** Outdoor receptacles required by the design criteria for sole use of vehicle cold weather heating shall be kept to the minimum required for the vehicles essential to the facility operation. Such receptacle circuits shall be 120 Vac, single-phase, 20 amp, and shall have ground fault protection. They shall also be thermostatically controlled to energize only at 25EF or lower with the exception of those for electric vehicles. These shall not be thermostatically controlled. The receptacles shall be 20 amp grounding type. Each rack of six such receptacles shall be provided with a readily available disconnect switch.

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- 2.9 In addition to NEC requirements all new office buildings or office spaces shall be provided with a 20A duplex for each 100 square feet or fraction thereof.
- 2.10 **In-Cell Welding Outlets** Welding outlets in processing cells shall be designed to include electrical outlets inside the cell for power tools and welding leads to accommodate maintenance activities. Outlets shall be provided with splash-proof covers to allow washdown of cell areas without damage to the electrical connection. Special requirements will be identified in the project Design Criteria. For remote applications suitable connectors shall be used.

DOE-ID ARCHITECTURAL ENGINEERING STANDARDS	TITLE: ELECTRICAL COMPONENT MARKING	
	DATE: December 1998	SECTION: 1646

## 1646-1. CODES AND STANDARDS

### 1.1 Applicable Codes and Standards

- AES 0100-1, Codes and Standards

## 1646-2. ELECTRICAL COMPONENT MARKING

2.1 All electric equipment and receptacles shall be identified. They shall have their source of power and voltage legibly identified by means of labels permanently affixed to the equipment. Additional label information will be supplied in the project Design Criteria.

2.2 **Raceways, Boxes, and Receptacles** Raceways, boxes, and receptacles to be marked are those containing circuits operating in excess of 120 V to ground or in excess of 240 V line-to-line, on grounded or ungrounded systems.

- Marking of exposed raceways, boxes, and receptacles shall be located at origin and destination, at accessible boxes and fittings with removable covers, at least once in each room, compartment or vault, within 2-ft of wall, floor, or ceiling penetrations, and every 20-ft. Judicious selection of marking locations may satisfy several of the above requirements simultaneously.
- In small buildings, rooms, etc., where very few exposed raceways exist and the function, origination, and destination of the raceway is obvious, no marking shall be required except a voltage marking at accessible junction or splice boxes with removable covers.
- Voltage marking shall not be required in administration areas such as offices, reception rooms, etc., where the circuits operate at 120 volts or less to ground.
- Raceways entering switch boxes shall be marked within 2-ft of the box. Where the raceway is not exposed, the box cover shall be marked in lieu of the raceway.
- Marking (non-engraved) shall be permanent black identification on an orange background, with length as indicated below, encircling a majority of the visible part of the raceway.
- Identification letter/number and label size shall comply with the following: (nearest size is acceptable).

Conduit Trade Size or Largest Dimension, Except Length of Other Raceway (in.)	Band Length (in.)	Legend Letter/Number Size (in.)
¾ to 1 ¼	8	½
1 ½ to 2	8	¾
2 ½ to 6	12	1 ¼
8 to 10	24	2 ½
over 10	32	3 ½

- Labels and lettering shall be in the most visible and prominent position.

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- (h) Identification shall include conduit numbers (where designated), cable or circuit number on an orange background band, such as "480 VOLTS F4-67," or "120 VOLTS LP-6-15."
  - (i) Spare raceways should also be marked. Spare raceways should be marked only with a raceway number such as "R-50" or "C-109." Where such raceways are not exposed, the marking should consist of etched or stamped numbers on accessible plugs or caps or on metal tags attached to the stubs, caps, or plugs.
- 2.3 Service Disconnects** All service disconnects shall be identified on the outside covers with the words, "Service Disconnect" in orange letters sufficiently large to be readily visible.
- 2.4 Hazard Marking** Raceways, fittings, and boxes containing circuits of 10 kV or higher potential shall, at all access points, have yellow painted covers with "CAUTION kV" painted thereon in black. (Add kV potential in blank spaces). accessible wireways, busways, and cablebus shall be so identified every 10 ft. Trays shall be so identified every 15 ft. Interior open wiring systems, where used, including metal-sheathed and metal clad cable, shall be similarly marked with yellow tags at least 7 sq. in. in area, with black printing. Tags shall be attached with plastic ties. Tags shall be placed in the same positions for conduit marking.
- 2.5** Certain types of switchboard metering and relaying instruments with provision for inplace testing by means of a test adaptor can cause a high voltage arc if the current transformer secondary connections are not properly shorted. Such devices should be permanently marked to indicate the hazard. Marking may consist of tags as described in the preceeding paragraph, or they may be yellow labels, yellow painted exterior handles, or a yellow band around the instrument case of the panel cut-out. For any type of marking, the hazard, the precautions, or the applicable procedure should be noted thereon.
- 2.6 Identification of PPS** PPS equipment, parts, assemblies, and subassemblies, including the wires, cables, conduit, etc., that are part of the PPS, shall be clearly and uniformly identified. Parts or components installed as subassemblies in larger identified assemblies do not require identification. For example:
- (a) A conduit containing only PPS wiring requires identification of the conduit, but not the wires contained in the conduit.
  - (b) An enclosure containing only PPS equipment requires identification of the enclosure, but not the subassemblies contained in the enclosures.
- 2.7 Label Size and Color** Color identification for all PPS shall be white letters (PPS) on a deep purple background.
- 2.8** Label size, lettering, and application shall be in accordance with the above supplemented as follows:
- (a) For parts (assemblies or subassemblies) the label shall be 2 x 4 in. minimum (standard size) with lettering proportioned to size.
  - (b) Where assemblies or subassemblies are too small for the standard size label, the minimum size allowed will be lettering legible at a distance of 3 ft from the assembly or subassembly.

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- 2.9 Label location shall be in the most legible position. Wire and cable markers shall be wrap-around type and be affixed per Wiring Methods and Materials Section.



**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS**TITLE: LIGHTING  
DATE: January 1997

SECTION: 1655

**1655-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards.
- C AES 1600-1.1, Applicable Codes and Standards
- C IES Lighting Handbook

**1655-2. INTERIOR LIGHTING**

- 2.1 Light sources shall have a color rendering index of 65, minimum, except for warehouses, large process areas and other large areas where close work is not performed on a routine basis.
- 2.2 Fluorescent fixtures in general should be rapid start, bipin type, with individually fused high power factor Class P ballasts. Diffusers and lenses shall be manufactured of 100% virgin acrylic. Internally illuminated exit signs shall be translucent green on opaque white. Acrylic lenses should not be installed in a continuous path in high value areas such as reactor or experiment control rooms, computer room, etc.
- 2.3 Higher voltage lighting systems and higher efficiency lamp systems shall be used where practical. High pressure sodium lamps may be used for interior lighting where permitted by the Design Criteria provided the color rendering index is at least 65 and the ceiling height is 10 feet or higher. Wall mounted HID must be mounted 12 ft or more above walking areas, or diffused to reduce glare. High pressure sodium is desirable, if suitable for the area, due to its high efficiency.
- 2.4 Lights installed in remote cells shall be designed to incorporate remote replacement/handling features.

**1655-3. EXTERIOR LIGHTING**

- 3.1 **Commercial Power** Where discharge lighting loads are used, ballasts shall operate at 480 volts when 480Y/277 volt service is available and cost effective.
- 3.2 **Backup Power** Site or facilities requiring continuous lighting for safety or security reasons shall have a standby or emergency power source as appropriate for such lighting.
- 3.3 **Switching** Selective manual/automatic switching systems shall be used to turn off all unnecessary lighting during inactive periods, consistent with safety and security requirements.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: SPECIAL SYSTEMS**  
**DATE: January 1997 SECTION: 1660****1660-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

C AES 1600-1, Codes and Standards

**1.2 Referenced Codes and Standards**

C DOE O 420.1, Facility Safety

C DOE G 420.1X, Implementation Guide for Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria

C ANSI/IEEE 484, Recommended Practice for Design and Installation of Large Lead Storage Batteries for Generating Stations and Substations

C NFPA 101, Life Safety Code

C NFPA 110, Emergency and Standby Power Systems

**1660-2. EMERGENCY POWER SYSTEMS**

2.1 Emergency power systems shall comply with the NEC, NFPA 101, and NFPA 110.

**1660-3. UNINTERRUPTABLE POWER SUPPLY SYSTEMS**

3.1 Uninterruptable Power Supply systems shall be provided when required by the project design criteria. The AE shall consider and identify any additional essential systems needing uninterruptable power for code requirements or for safe and proper functioning or shutdown, as appropriate. Such power shall be supplied by maintenance free, gel cell battery units or by vented high capacity wet cell batteries, giving due consideration to explosive, noxious, toxic, or corrosive gases or vapors and exhausting schemes.

**1660-4. CATHODIC PROTECTION**

4.1 Cathodic protection systems are currently in service at ICPP, TRA, and TAN. These systems are impressed current systems with anodes distributed throughout the facility areas. Locations for application of Cathodic Protection shall be described in the project Design Criteria. Cathodic protection requirements for underground storage tank systems are located in 40 CFR 280, "Technical Standards and Correction Action Requirements for Owners and Operators of Underground Storage Tanks." Where new piping, equipment, etc., are installed in plant areas having existing cathodic protection systems, the new installation shall be connected to the existing system. The design must ensure that new buried metallic piping systems are consistent with existing underground corrosion protection practice. If necessary, the existing cathodic protection system shall be upgraded to handle the additional load.

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- 4.2** Where buried pipelines are to be provided with cathodic protection systems, all pipe joints shall provide electrical continuity except for isolating joints where pipelines enter buildings. Where joints do not provide positive continuity, or where the continuity is questionable, such as cast iron pipe with gasket sealed joints, the joints shall be electrically bonded with jumpers across each joint. Where cathodic protection of a PVC pipe system is required to protect the ductile iron cement lined fittings, the fittings shall be electrically bonded by connecting to the existing cathodic protection system. Isolating joints shall be used on all cathodically protected pipe where it enters a building or facility where a grounding electrode system is required. This isolation joint shall not be jumpered. Where the isolating joint has been jumpered, remove the jumper if possible. Where uncoated cathodically protected pipes enter existing facilities without isolation joints, these cathodically protected pipes shall be bonded to the grounding electrode system with a No. 6 AWG bare copper bonding conductor in accordance with the NEC. Coated pipes shall not be bonded. Cathodically protected piping or conduit shall not be connected to substation grounding grids nor to any other exterior grounding conductors. Isolated or small sections of coated buried piping requiring temporary protection may be cathodically protected using galvanic anodes.
- 4.3** Cathodic corrosion protection systems shall include engineered features that protect against abnormal conditions such as stray currents or system failure.
- 4.4** Construction of additional buried structures and piping may require installation of additional anodes and test stations to ensure protection of the structures from external corrosion. Evaluation of the existing cathodic protection system's capacity is required prior to adding structures, piping, or additional anodes to the system. This evaluation shall be addressed in the conceptual stage of the project.
- 4.5** When possible, new buried pipelines should be located parallel to existing cathodic protection systems, and the pipe should be installed at the same elevation as the existing anodes. Shielding of existing buried pipes from the existing anodes with new structures shall be avoided.
- 4.6** Cathodic protection installation requires the following considerations:
- (a)** Buried metallic structures and piping shall be electrically connected to the negative side of the rectifier. Negative riser cables constructed of No. 2 wire are connected to existing pipelines through test bond stations. New buried metallic structures and piping must be bonded to other metallic structures which are connected to the negative riser. In some cases, a new negative riser cable directly connecting the rectifier to the new structures may be required.
  - (b)** Metallic pipelines shall be electrically interconnected to the cathodic protection system. To ensure against possible insulators in pumps, flanges, diversion boxes, and other internal junctions, underground metallic structures should be electrically bonded directly at all intersections and between long sections of parallel pipelines. When test stations exist, the bond can be made directly between two structures using suitable size installed burial cable connected to the structures by thermite welds or welded straps. Bonds and test leads with piping identification shall be provided for each buried structure.

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- (c) Permanent reference electrodes shall be installed to monitor structures and/or piping that are buried under buildings or roadways and are inaccessible for testing with surface reference electrodes. The permanent electrode lead shall be terminated in the same terminal box as the test leads of the lines or structures to be tested.

- 4.7 For more information on cathodic protection installation, see the appropriate drawings and specification listed in Appendix D and Appendix I.

**1660-5. BATTERY ROOMS**

- 5.1 Refer to Section 0185 and NEC Article 480. Unsealed, off-gassing types of batteries should not be in close proximity to sensitive electronic or relaying equipment to avoid corrosion of the equipment. Recombining caps shall not be installed or used on battery cells. Batteries of "gel cell" type are generally exempt from the requirements of this section, except where analysis shows that explosive or corrosive gases or vapors may present a problem. Batteries, except "dry cell" type, shall have over pressure vents. Battery density should not exceed 8 watt hours per cubic foot of space per air change per hour where final charge rate in amperes is less than  $C/10$  amp. ( $C$  = rated cell capacity in ampere hours). Where forced ventilation is required, loss of forced ventilation shall cause an alarm in a continuously occupied area, and shall cause interruption of the charging current to the batteries.

**1660-6. SPECIAL REQUIREMENTS FOR NUCLEAR APPLICATIONS**

- 6.1 Refer to DOE O 420.1 and DOE G 420.1X for requirements and guidance regarding nonreactor nuclear facility electrical systems.
- 6.2 Electrical wiring installed in areas where the total integrated gamma dose for the useful life of the facility is calculated to be  $10^6$  rads or greater, such as hot cells, shall have insulation such as crosslinked copolymer, polyvinyl chloride, or polyethylene and shall be installed in rigid or intermediate metal conduit. Radiation doses will be specified in the project design criteria.
- 6.3 Raceways penetrating radiation shielding or permanent contamination zones shall contain sufficient bends, curvature, or shielding to prevent radiation streaming through the void. Such raceways shall contain double seals to prevent differential pressure from driving gaseous or particulate matter through the shield. UL labeled hazardous area conduit seals are not generally sufficient without use of an additional or alternate sealant such as Chico X Compound.
- 6.4 Process cell subject to acid wash decontamination shall be provided with stainless steel conduit.

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- 6.5 For reactor plant tray systems, vertical runs of cable tray and/or wireway shall have UL or Factory Mutual approved fire stops every 15 ft or at every floor level, whichever is less. For horizontal runs of covered tray and/or wireway, such stops shall also be applied every 20 ft. The stops shall completely fill the entire cross-section of the tray. The cable shall be certified by UL to pass the IEEE 383 Vertical Flame Test modified for a 70,000 Btu/h input. Data and instrument cables are exempt from the latter requirement if they and the equipment they connect to are in compliance with NEC Article 645 or 725.

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE: INSTRUMENTATION**  
**DATE: January 1997****SECTION: 1665****1665-1. CODES, STANDARDS, AND GUIDES****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 1600-1.1, Applicable Codes and Standards
- C ANSI/HFS 100 1988 Human Factors Engineering of Video Display Terminal Workstation.
- C ANSI Y32.2/IEEE 315-75 & 315A-86, Electrical and Electronics Graphic Symbols and Reference Designations
- C ASME, Fluid Meters Handbook

**1.2 Referenced Codes and Standards**

- C ISA, Standards and Practices for Instrumentation

**1665-2. GENERAL**

- 2.1 Instrumentation shall be designed and selected in accordance with the project Design Criteria with consideration for future data collection needs as specified. Locally mounted instruments, such as pressure gauges, sight glasses, thermometers, etc., shall be accessible for reading and maintenance purposes.

**1665-3. IDENTIFICATION AND DRAWINGS**

- 3.1 All instruments shall have identifiers based on Instrument Society of American Standard S5.1 and the established plant instrumentation numbering system. Each instrument not mounted on a panel shall have attached to it an engraved (or other appropriate method) nametag with minimum 1/4-in. letters. The nametag shall be constructed of a material suitable for its environment. Specifically colored nametags may be required. For panel-mounted instruments, the nametags shall be mounted on the front and rear of the panelboard adjacent to the instrument or be made a permanent part of the panelboard or instrument.
- 3.2 Instruments and controls shall be documented by the use of P&IDs, logic drawings interconnect drawings, loop drawings, and/or layout drawings in appropriate combination to provide information required for the installation operation, and trouble shooting of the control system. ISA Standard S5.1 and S5.3 will be the basis of P&IDs. ISA Standard S5.2 will be the basis of logic drawings. ISA Standard S5.4 will be a general guide for the preparation of loop drawings.
- 3.3 The AE will include a ladder-type or control diagram in addition to a narrative description of the control logic for process controllers. The narrative description is to be provided either on the drawings or included in an operating manual if one is provided.

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**1665-4. PNEUMATIC INSTRUMENTS**

- 4.1 **Instrument Air** Instrument air must be supplied to instruments as oil-free, dry air with a dew point of -20°F or lower.
- 4.2 **Signals** Pneumatic process instrumentation shall normally be designed for 3 to 15-psig signals from transmitter output through control valve input signals. This includes recorders, indicators, and controllers.
- 4.3 **Provision for Calibration and Removal** Tees and valves shall be appropriately installed in each pneumatic signal line to a recorder, switch, indicator, controller, etc. to accommodate calibration and removal. Tees for future signal access to data acquisition transducers may also be required. Differential pressure transmitters shall have five valve manifolds mounted on them for calibration. Single input pressure transmitters also shall have provisions made for calibration connections.

**1665-5. ELECTRONIC INSTRUMENTS**

- 5.1 Conventional electronic analog process instrumentation shall comply with ISA S50.1, Compatibility of Analog Signals for Electronic Industrial Process Instruments. Standard voltage and current signals shall be 4 to 20 ma as defined in ISA S50.1 Section 3. will be used as a guideline for proper grounding and shielding of signal leads. When multiple loops are supplied by a single power supply, each loop shall be individually fused. In addition to the circuit separations called for by the NEC or other more restrictive documents, instrumentation wiring shall not be enclosed in a conduit or cable tray with DC power wiring energized at greater than 80 V to ground, nor with AC power lines. Instrumentation wiring conduits or cable trays shall be grounded. Locate transmitters with radiation area inputs in cabinets as required below.
  - (a) **Alarms** Panelboard and CRT status lights to indicate alarm conditions shall be color coded based on existing plant practice or as specified in the project Design Criteria. Audible alarms (annunciator horns, etc.) must be distinctive and uniformly applied. Bells as audible devices are reserved for radiation related alarms only. A blinking light or a blinking message on a CRT display denotes a signal that is out of normal operating limits.
  - (b) **Terminations** Instrument wiring shall only run between instruments or terminal strips. Terminal strips shall be located only in junction boxes or control panels. Terminal block jumpers within the same enclosure and less than 12 in. away are exempt from labeling. Connections to screw terminals shall be made with crimped terminations that have been made with calibrated tools. Wire nuts are not allowed. Butt splices shall be avoided. EXCEPTION: Butt splices may be used only on instruments furnished with leads; not to exceed three (3) butt spliced per instrument. Instruments that would require in excess of three butt splices shall have a terminal block installed.
  - (c) **Thermocouples** All thermocouples installed in radiation areas shall be a dual type with the second element brought out to the first convenient location (for substitution).
  - (d) **Data Acquisition and Control Systems** Data acquisition and control equipment

includes devices that monitor and/or supply process signals. Digital subsystems must be compatible with the overall CPU and bi-directional communications. All inputs and outputs shall be isolated by relays, optically coupled devices, or power drivers. Outputs shall also be protected so that accidental shunting of the load does not result in failure of the output power supply. Appropriate noise suppression methods shall be incorporated in the design to ensure that output operations do not interfere with CPU operation. Sufficient documentation shall be provided to allow maintenance and operation independent of the supplier. This documentation shall include operating and maintenance manuals, including troubleshooting procedures; a complete drawing package, including system block diagrams; logic diagrams; schematics; and a complete software package, including flowcharts, coding with comments, and software instruction manual.

- (e) **Cable Installation** Installation instructions in the specifications shall require that the pulling capacity not be exceeded when instrument cable (twisted pair, coax, etc.) or fiber optic cable is installed. Use of a dynamometer may be recommended when mechanical assistance is required. ANSI/IEE Standard 576, IEEE Recommended Practice for Installation, Termination, and Testing of Insulated Power Cables as used in the Petroleum and Chemical Industry shall be used in designing cable layouts to avoid installation problems.

## 1665-6. NUCLEAR SYSTEMS INSTRUMENTATION

- 6.1 Design of process and nuclear monitoring instrumentation, will depend on the type of facility and the requirements of the project Design Criteria. Logic descriptions (i.e., flow diagrams and description of operation) of the different systems shall be prepared and approved prior to detailed design. Generally, pneumatic instrumentation systems shall not be used where the potential for feedback of radioactive materials exists.
  - (a) **Radiation Monitoring** Continuous monitoring shall be provided for facilities that may discharge radioactive contaminants to the atmosphere or ground. Radiological grid air monitoring systems will be required only when specifically called for in the project Design Criteria.
  - (b) **Single Failure Analysis** A SFA shall be used to determine if redundancy of equipment, systems, instruments, circuits, controls, sensing devices, etc., will be required for safe operation in nonreactor facilities. The project criteria shall specify if SFAs are a requirement of the project and what standards will apply. Examples of these standards are ANSI/ANS 58.9-1981, ANSI/IEEE 379-1977, and USNRC Reg. Guide 1.53.
  - (c) **Shutdown Systems** Auxiliary equipment, including necessary backup power and utility supplies, shall be provided, where required, to enable orderly shutdown in case of power loss or emergency. All instrument systems, including control valves, should be designed so that in the event of a power failure, "fail safe" process conditions will result.
  - (d) **Seismic Instrumentation** A seismic switch shall be provided to enable the shutdown of a nonreactor facility when horizontal and vertical vibrations exceed a



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certain predetermined value that shall be stated in the project Design Criteria.

- (e) **Seismic Restraints** At all points where safety related and instrumentation devices are required to pass through places of restraint (penetration) or restricted movement, adequate provision shall be made in design to ensure safety and proper functioning during seismic (earthquake) disturbances.

**1665-7. ICPP SPECIAL REQUIREMENTS**

- 7.1 In addition to the requirements listed elsewhere in this section, ICPP has the following special requirements:
  - (a) Instrument identification legends, loop drawing formats, and symbols for ICPP shall conform to the appropriate ICPP drawing listed in Appendix A.
  - (b) ICPP has adopted the chromel-alumel (Type K) thermocouple as plant standard.
  - (c) Requirements for PPS shall be defined in Safety Analysis Reports and in ICPP directives, procedures and manuals. Reference to PPS requirements will be described in project design criteria documents.
  - (d) Multipen recorders should be configured so the red pen is density, green is level, and blue is pressure.
  - (e) Air or nitrogen purged probes are used throughout the ICPP plant for measuring pressures, column weight, liquid levels, densities, and two phase liquid interface locations because purged probes do not have moving parts or wiring within the processing cells and therefore require little or no in-cell maintenance. Purge pressure systems shall be nominally 20 psig air or nitrogen.
  - (f) The rotameter used with the purge system shall have an integral control valve on the outlet, and its range shall not exceed 5 standard ft<sup>3</sup>/h. The tubing to the vessel shall be minimum 3/8 in. Humidified purge gas or water drip probe systems may be required. If needed, the moisturizing system should be automatic wetting and designed so that flooding of the vessel is not possible. Use of other than a purged probe system requires permission of ICPP Plant Engineering.
  - (g) Instrument lines may not contain check valves or traps and shall be sloped from the purge rotameter outlet toward the vessel.
  - (h) Vessel content measurements are sometimes required. Vessel weight shall be mechanically transmitted out of the radiation area to permit installation of transducers in a maintainable location. The installation shall provide for calibration. The attachment of pipes shall be designed to eliminate effects on tank weight measurements. If cooling water jackets are required, they shall be designed to maintain a constant volume.
  - (i) To control spread of contamination, pressure transmitters with inputs from radiation areas shall be mounted in NEMA rated dust-tight enclosures or be located in rooms

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designed to contain contamination.

- (j) Digital computers used for process monitoring or control shall be validated for use by design control and testing as described in project design documents. Software shall be verified. SO tests shall be prepared for verification.

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**1670-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- C AES 0100-1, Codes and Standards
- C AES 0185-4.1 and 4.2.
- C AES 1530, Fire Protection Systems
- C AES 1600, Electrical Design
- C NFPA-101, Life Safety Code

**1.2 Referenced Codes and Standards**

- C NFPA-72, National Fire Alarm Code

**1670-2. GENERAL**

- 2.1 Interface requirements for the specific system will be submitted to the AE in the Design Requirements.
- 2.2 **Alarm Compatibility Requirements** For DOE-ID facilities located at the INEL, the INEL site fire communication system shall be compatible with the CFA Site Alarm System main fire alarm computer or supported hardware. System compatibility shall be verified by C&AO.
- 2.3 **Alarm Reporting Requirements** INEL fire alarm systems including initiating appliances shall annunciate at the CFA Site Alarm System, the local fire station (if applicable), and the area emergency response organization (if applicable), with communication between fire alarm panels within a facility and the CFA Site Alarm System via fiber optic cable circuits. The CFA Site Alarm System fire alarm computer shall report to the Warning Communication Center in Idaho Falls.

Communication panels reporting to the CFA Site Alarm System main fire computer using a unique seven digit event number. Event numbers shall correspond to a hardware address in the communication panel and a software message in the main fire alarm computer. Software entry and hardware assignment on the main fire alarm computer shall be done by the C&AO.

Fire alarm systems in Idaho Falls facilities shall report to the CFA fire alarm computer.

- 2.4 The C&AO must be present to witness final connections to existing systems. All security system final wire connections that are associated with classified security cabinets and/or circuits must be connected by the authorized OC.

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- 2.5 To insure proper operation the Subcontractor shall perform an operational test in accordance with an approved test plan to be witnessed by the Contractor's Representative. The C&AO will also perform an System Operational (SO) test prior to commissioning the new system.

### 1670-3. GENERAL FEATURES

- 3.1 Circuit styles shall be determined by the OC Facility FPE and included in the design criteria.
- 3.2 Fire alarm systems shall be designed to provide local warning for building evacuation and area notification for emergency response personnel.
- 3.3 Low Air Temperature Thermostat switch shall be provided with a normally open contact with temperature setting at 40EF.
- 3.4 Circuits located in a building other than where the fire alarm panel is located shall use transient eliminators. They protect the fire alarm panel from lightning or over-voltage conditions. Transient eliminators should be installed near the fire alarm panel in a JA box. Surge suppressors are required to be wired to the building grounding system.
- 3.5 Multiplex output modules controlling output functions (alarms etc.) shall be equipped with a switchable device to disconnect the output functions. When in the switched position a trouble alarm shall be reported to the Fire Station computer.
- 3.6 Sprinkler riser assemblies, sprinkler supervisory switches, flow indicator switches, and solenoid releasing valves for sprinkler systems shall be supervised at the alarm panel and monitored at the Central Facilities Area Fire Station.

### 1670-4. AUTOMATIC FIRE DETECTION SYSTEMS

- 4.1 **General** The need for an automatic fire detection systems will be determined by the OC Facility FPE. Smoke Detectors will normally be specified in areas where a life safety hazard exists, or in areas housing high value electrical or electronic equipment where damage may be severe during the incipient stages of a fire.
- 4.2 Smoke detectors shall be installed per NFPA spacing guidelines with maximum distances based on approvals issued by these agencies. Detectors shall be rated for the altitude where they are installed.
- 4.3. Smoke detectors that activate a special extinguishing systems shall normally be "cross-zoned" with one zone being ionization type and the other zone being of the photo-electric type.
- 4.4 Smoke duct detectors shall be provided with two alarm contacts, and one set of trouble contacts when powered from a source separated from the fire alarm panel. One contact shall be for alarm reporting and the other shall be used for ventilation shutdown. Trouble contacts shall operate when the smoke detector internal circuitry or power from the separate source fails.
- 4.5 The Ventilation shut down shall be through a normally closed contact of the smoke duct 5

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detector. These shall be designed to have the ventilation system fail to a safe condition. Ventilation shutdown when required may be controlled by a supervised relay, a fail safe relay, or a combination of both.

- 4.6 A remote test station shall be provided when smoke detectors are installed in ducts eight feet above the floor.
- 4.7 When a smoke detector is used strictly for door release and is not required for open area protection it shall not be required to report as a fire alarm but should report as a supervisory signal.
- 4.8 Heat detectors or approved high humidity rated smoke detectors shall be used in rest room facilities or in areas where smoke detector installation could cause a high rate of nuisance alarms, areas housing ordinary combustible materials, or as specified by the OC Facility FPE Project Design Criteria.
- 4.9 **Zoning of Alarms** Alarms should be combined when multiple signals operate as a single function. An example is a preaction system when a detector will cause an alarm and water flow alarm will be generated.

#### 1670-5. FIRE ALARM PANEL AND WIRING REQUIREMENTS

- 5.1 The multiplex fire alarm panels within a facility communicate by use of dedicated hard wire circuits. Communication from a facility to the Central Facilities Area is accomplished by fiber optic data transmission circuits. Fiber optic communication links may be utilized where economically feasible.
- 5.2 Multiplex panels report signals using a unique seven digit event number. Event numbers correspond to a hardware address on the Multiplex panel and a software message at the fire alarm computer. Software entry and hardware assignment on the fire alarm computer shall be done by the OC.
- 5.3 **Fire Panel Battery Back-up** Each fire protection panel shall have a design battery back-up capability of 24 hours with 5 minutes of alarm capacity in accordance with NFPA 72.
- 5.4 **Panel Limitations** Limitations on the number of buildings on one fire alarm reporting panel shall be established in the design criteria phase by the OC Cognizant FPE based upon the square footage of the building, occupancy rating per the UBC code, and the occupant load of the building.
- 5.5 **Supervisory Alarms** Provisions shall be made for supervising the status of all fire protection systems, unless otherwise approved by the OC Cognizant FPE. This shall include but is not limited to, cabinet tamper, fire system control valves, pressure in dry pipe systems, low nitrogen pressure in dry pilot detection systems or supervised pre-action systems, low water level and temperature on water storage tanks, fire pump running, auto position of fire pump controller, fire pump controller trouble, dry pipe valve enclosure temperature, fire detection system trouble, and special extinguishing system trouble.

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- 5.6 Field Device Wiring Criteria** Field devices shall be UL listed for use with the fire alarm panel.
- 5.7** Different types of fire system actuation and supervisory alarms (e.g., water flow, manual pull station, smoke detectors, air pressure monitors, valve tamperers, air temperature monitors, etc.) shall not be grouped on a single alarm zone. Sectional valves grouped on a single alarm zone shall be within 10 feet of each other. No more than four similar devices shall be installed in a single supervisory alarm zone.
- 5.8** Power limited wiring, communication wiring, Class 2 and Class 3 wiring (including fiber optic cable, telephone, local area network, evacuation audio and control, voice paging audio and control, other audio, fire alarm detection and supervision, and fire alarm communication) shall share the same conduits and raceways to the maximum extent possible. Installation shall comply with requirements of the NEC, NFPA 70.
- 5.9** Control and audio signals that may cause building/area evacuation, or critical system shutdown by opening or shorting circuits shall be installed in dedicated conduits.

**Requirements:**

- (a) Fire alarm circuits (24V) that could cause building evacuation, equipment shutdown, or system dump from wire tampering shall be installed in dedicated raceways. Circuits that could impose spurious signals on fire alarm initiating circuits such as 70V audio circuits SHALL NOT be installed with fire alarm initiating circuits (such as smoke detectors, manual fire alarm pull station, water flow indicators or any other shorting devices). Fire alarm communication circuits SHALL NOT be installed in the same raceway as 70V audio circuits.
- (b) All hard wired (copper conductors, not fiber optic) control circuits for control of evacuation, voice paging, fire alarm, and other audio circuits shall be installed in dedicated conduits. Control circuits are those circuits which provide communication between field panels and centrally located transmitter/receiver units.
- (c) All wiring installed between buildings, or wiring installed to devices located outside of the building shall be run in conduits.
- (d) Non-metallic conduit shall have a ground conductor or shield ground conductor installed.
- (e) Buildings used only for offices and other business occupancies may have power limited plenum rated wiring to other than hard wired control circuits installed above suspended ceilings in open raceways or in cable rings secured to structural members. This wiring includes communication wiring, and Class 2/Class 3 wiring including fiber optic cable, telephone, local area network, evacuation audio, voice paging audio, other audio and fire alarm detection/supervision. Such wiring shall be installed in accordance with the following restrictions:

All exposed wiring below the suspended ceilings, and wiring inside walls shall be installed in dedicated conduits.

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Cables shall be installed either parallel or perpendicular to building structural members.

Cable, if not installed in cable tray, shall be supported by cable rings at a maximum six foot intervals.

Cable rings to be secured to building structural members.

Cable shall not be installed with wire tie-wraps or similar equipment.

- (f) Wiring within a fire alarm panel (not leaving the fire alarm panel enclosure) shall include an abbreviated destination address on each conductor. The abbreviated destination wire address shall include row, column, terminal strip and terminal point. Wire labels on conductors are not required if wire lengths are less than one foot in length.
- (g) Each alarm zone shall be identified stating the type of alarm and its location. This shall be accomplished by installation of a label on the zone module or providing an event list (laminated sheet) at each panel, cross referencing each module with its function. Fire alarm panel reporting to the Central Facilities Area fire station shall be assigned events numbers associated with input zone modules. The laminated sheet associated with the event number shall be provided by the OC as part of the final Acceptance test.
- (h) The fire alarm and supervisory signals shall report to a Multiplex alarm reporting panel. Event number tags shall be installed at each alarm zone and each location in which the alarm can be tested.
- (i) When a fire alarm device is located where a tag is not visible or in a false ceiling, an additional tag shall be installed below the false ceiling, where it is visible. When alarm contacts are located in a fire alarm control panel the event tags (event list) shall be attached to the outside of the panel.
- (j) Cabinets, control panels, fire alarm reporting devices, supervisory devices, speakers and other fire alarm devices shall be provided with tags indicating the unit number.
- (k) **Example** A sprinkler riser will need a minimum of two event tags at the control valve at the riser and at the flow indicator device.
- (l) Tags shall be of red engraved laminated phenolic resin nameplates with white lettering or stainless steel plates. Unit tags shall be made with one inch high lettering. Lettering on event tags shall be one half inch high. A tag shall be permanently attached at each alarm.

## 1670-6. SPECTRUM DEPENDENT COMMUNICATIONS SYSTEMS

- 6.1 All spectrum dependent communications equipment (radio, microwave, etc.) requires NTIA approval prior to the purchase or use within any U.S. government facility.
- 6.2 The OC will provide the AE with the requirements for the proposed systems. This organization will prepare a proposal for review by the NTIA. When the proposal has been

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approved, detailed design requirements will be forwarded to the responsible AE. The OC will provide the procurement information and any special installation and operational requirements for the approved equipment.

- 6.3** The design shall include system arrangement, equipment location, and associated architectural features. The purchase, installation, and operation of spectrum related communications shall comply to the requirements as detailed in the license application. The OC will review all designs in a formal design review process for these systems and will witness acceptance tests of these systems.

**1670-7. VOICE PAGING AND EVACUATION SYSTEMS ALARMS**

- 7.1** The voice paging/evacuation systems shall be designed to be compatible with and will readily integrate with the site-wide emergency alarm systems presently in operation at DOE-ID. To implement this requirement, each AE organization involved in the design of new alarm systems will comply with the requirements as outlined by the Design Criteria.

**1670-8. TELEPHONE SYSTEMS**

- 8.1** Telephone, telegraph, and other communication systems, when required, shall be designed in accordance with the project Design Criteria.



## **Appendix A**

### **Request for Waiver Form**

**Instructions:**

**Use INEL Form 1-04B (2/78)**



# REQUEST FOR WAIVER OF CODE OR STANDARD

FORM L-0431.27#

'08-96 - Rev. #00)

Use form as a record of change to baseline engineering requirements documents on an individual project. Does not supersede the requirements of ID Order 5483.1 on obtaining waivers from safety standards or relax conformance with the safety exception procedures stated in the Operating Contractor's Safety Manual.

Project Title: \_\_\_\_\_ Date: \_\_\_\_\_

Project Identification Number: \_\_\_\_\_ QA Level: \_\_\_\_\_

Code of Requirement to be Waived: \_\_\_\_\_

Specific Requirement or Guideline: (by paragraph number) \_\_\_\_\_

Description of Exception:

**EXAMPLE**

Justification: (include estimate of cost reduction)

Possible Effect: (include possible adverse effect on longevity, safety, etc.)

Requestor: \_\_\_\_\_  
Name

Approvals:	Project Requestor:	_____
	Safety Review Coordinator:	_____
	Quality:	_____
	Facilities Management:	_____

ID Concurrence: Comments and/or Conditions

Signature: \_\_\_\_\_ Title: \_\_\_\_\_

## **Appendix B**

### **Generic Scope of Work Statement**

## **Appendix B**

### **Scope of Work Statement for the Title I and II Design of the \_\_\_\_\_ Project**

# Scope of Work Statement for the Title I and II Design of the \_\_\_\_\_ Project

## 1. GENERAL

The Architect-Engineer (AE) shall provide Title I and II design services for the \_\_\_\_\_, located at the Idaho National Engineering Laboratory (INEL). Conceptual design work on the facility has been completed and is documented in the report(s) listed below:

- (1)
- (2)
- etc.

The AE shall utilize those portions of the concepts developed in these reports that are not in conflict with, or superseded by, the documents identified in Section 2.

## 2. DESIGN BASES

The bases for preparing the design shall be:

- 2.1 Project Design Criteria for \_\_\_\_\_
- 2.2 Quality Assurance Program Plan for \_\_\_\_\_
- 2.3 Idaho National Engineering Laboratory Cost Estimating Guide

## 3. WORK TO BE PERFORMED

- 3.1 Prepare a design proposal, including a design cost estimate and a man-loaded schedule by discipline, for performing Title I and II engineering design.
- 3.2 Submit to and have approved by the Contracting Officer's Representative, a Project Management and Control Plan. This plan must include a description of the administrative and engineering procedures that will be used to control the preparation, review, approval, change, and distribution of design and supporting documentation, including analysis, interdisciplinary checks, schedule, and cost control.
- 3.3 Conduct field inspections of the area/facility where the project is to be constructed to review and understand the as-built and existing field conditions and interfaces, including existing process piping and utilities.
- 3.4 Review the project design criteria and reconcile all questions with the Contracting Officer's Representative.
- 3.5 Monitor design progress through the use of a Performance Measurement System, approved by the Contracting Officer's Representative, which compares work scheduled and work performed. Prepare and submit a monthly cost and progress report and make oral reports on a \_\_\_\_\_ schedule.

3.6 Prepare and transmit, within five (5) working days, copies of all meeting minutes and telephone conversations, regardless of who initiates the calls.

3.7 Design and construct a \_\_\_\_\_ scale model of the \_\_\_\_\_, showing the following details:

- (1)
- (2)
- etc.

### **3.8 Title I Design Services**

The AE shall perform the following work for Title I preliminary design:

3.8.1 Review the conceptual design reports and reconcile all questions with the Contracting Officer's Representative.

3.8.2 Develop and maintain a project master schedule for design, procurement, and construction. The schedule for design will include milestones and progress tracking features for each drawing and specification. The construction schedule will be integrated with planned operations and shutdowns.

3.8.3 Prepare and submit design, cost, and progress reports in accordance with the contract.

3.8.4 Perform the following special studies:

- (1)
- (2)
- etc.

3.8.5 Perform preliminary studies and/or recommend development and equipment mockup testing to ensure that the requirements listed in the project design criteria will be met and that the proposed design is functional.

3.8.6 Submit typical final Title II specification packages for at least one off-the-shelf item and one engineered item for review. The Contracting Officer's Representative will identify the items for which specifications shall be prepared.

3.8.7 Prepare an Energy Conservation Report in accordance with DOE Order 6430.1A.

3.8.8 Meet with DOE-ID and/or the Contracting Officer's Representative at the INEL or the AE office on a \_\_\_\_\_ basis to review work progress, design, and other concerns incidental to the work. Design review meetings will be held on a \_\_\_\_\_ schedule. The AE will be responsible for preparing an agenda for each meeting, including a listing of open action items, required completion dates, and responsibility for completion.

3.8.9 Provide the following input to the Preliminary Safety Analysis Report being prepared by the Operating Contractor: \_\_\_\_\_

3.8.10 Perform criticality and shielding calculations for \_\_\_\_\_ in accordance with \_\_\_\_\_.

- 3.8.11 Prepare and submit a list of all long-leadtime items. Prepare procurement packages for the design, fabrication, and delivery of long-leadtime items. Packages will be submitted for review and approval by the Contracting Officer's Representative.
- 3.8.12 Identify requirements for demolition, including removal, packaging, transport, and disposal of radioactive, toxic, and hazardous items.
- 3.8.13 Prepare a cost estimate, contingency analysis, escalation analysis, and preliminary schedule for all construction and long-leadtime procurement items based on detailed backup information and using the Code of Accounts as shown in the INEL Cost Estimating Guide. The cost estimate shall include estimates of material quantities and man-hours for construction.
- 3.8.14 Prepare and submit a Title I package composed of layout drawings, single-line drawings, outline specifications, cost estimates, construction schedules, calculations, and studies. Submittals shall include one reproducible set of half-size drawings, one reproducible set of D-size drawings, one copy of the specifications, and ten (10) copies of the schedule and cost estimate. The cost estimate shall be prepared in accordance with the INEL Cost Estimating Guide.
- 3.8.15 Participate in a formal design review, including presentation of the proposed design to establish its adequacy and ensure that it satisfies the project design criteria.

### **3.9 Title II Design Services**

The AE shall perform the following work for Title II detailed design:

- 3.9.1 Submit a Title II design schedule, including updated document preparation and submittal plan based on Title I design.
- 3.9.2 Meet with DOE-ID and/or the Contracting Officer's Representative at the INEL or the AE office to review work progress, design, and other concerns incidental to the work. Design review meetings will be held on a \_\_\_\_\_ schedule. The AE will be responsible for preparing an agenda for each meeting, including a listing of open action items, required completion dates, and responsibility for completion.
- 3.9.3 Complete all necessary restudy and redesign work resulting from review of the Title I work.
- 3.9.4 Prepare detailed construction cost estimates and critical-path-method-type construction and procurement schedules based on the approved design, working drawings, specifications, and anticipated materials availability. Assist DOE-ID in reconciling the estimates with independent cost estimates.
- 3.9.5 Assist DOE-ID and the Contracting Officer's Representative in reviewing the cost estimates and schedules and in securing, analyzing, and evaluating proposals and bids for materials, equipment, and services required for construction.
- 3.9.6 Prepare and furnish estimates during construction of the cost and time effects of approved engineering design changes.

- 3.9.7 Provide input as required to the Final Safety Analysis Report being prepared by the Operating Contractor.
- 3.9.8 Monitor and report design progress through use of the approved performance measurement system.
- 3.9.9 Participate in a formal design review of the proposed "approved-for-construction" design, including presentation of the design to establish its adequacy and to ensure that it satisfies the project design criteria.
- 3.9.10 Develop and submit a Title II package, including working drawings and specifications, loop diagrams, cost estimates, construction schedules, calculations, and specifications for construction and contract bidding. The combination of drawings and specifications shall contain all the information necessary to completely define the construction work, including a Schedule X list. A submittal for comment shall be made when the basic design is established (layouts, equipment sizing, piping routings, etc.). A submittal for approval shall be made of the detailed design at completion. An additional submittal of the drawings and specifications shall be made following approval by the Contracting Officer's Representative. Submittals shall include one reproducible set of D-size drawings, one reproducible set of half-size drawings (11 by 17 inches), and one copy of each of the full and half-size drawings, and two (2) copies of the specifications.
- 3.9.11 Additional information to be provided in the Title II package includes:
1. A Vendor Data Schedule containing a listing of all vendor data required to store, ship, inspect, maintain, install, and operate the equipment and verify vendors' compliance with the drawings and specifications.
  2. Piping, equipment, valve, and instrumentation lists.
  3. A quality assurance (QA) classification list containing a QA classification of all valves, equipment, instrumentation, and piping. This QA classification list may be included in the previous lists.
- 3.9.12 Prepare as-built drawings and specifications following construction, based on marked-up drawings and specifications provided by the Contracting Officer's Representative.
- 3.9.13 Prepare and submit a final design file containing as-built drawings, as-built original specifications, all design data, studies, calculations, computations, incorporated Document Change Notices, etc. Files, reports, and calculations. The file must be neat and arranged in an orderly manner.



## **Appendix D**

### **Standard INEL Drawings**

## Appendix D

<u>Drawing Title</u>	<u>Drawing Number</u>	<u>Issue Date</u>
Typical Roadway Sections	177339	9/21/92
Fence and Yards	177340	9/21/92
Symbols and Abbreviations	177341	9/21/92
Meter Connections	177342	9/21/92
Clearances	177343	9/21/92
Manhole Details and Notes	177344	9/21/92
Duct Bank Sections	177345	9/21/92
Instr. Id. Legend and Symbols	177346	9/21/92
Instr. Loop Diagram Instr.	177347	9/21/92
Fire Alarm System General Legend Sheets 1 and 2	423000	3/14/90 Rev. A
Cathodic Protection	177349	9/21/92
CPP-Instrument Identification, Legend and Symbols	058560	10/23/86
CPP-Piping and Instrument Legend, Symbols and Abbreviations	056381	12/06/91
CPP-Instructions and Illustrations for Construction of Instrument Loop Diagram Documents	093630	4/17/90
CPP-For Construction of Instrument Loop Diagram Documents Instructions and Illustrations	093631	4/17/90
CPP-Instructions and Illustrations for Construction of Instrument Loop Diagram Documents	093632	4/17/90
CPP-Instructions and Illustrations for Construction of Instrument Loop Diagram Documents	09363	4/17/90
CPP-Instructions and Illustrations for Construction of Instrument Loop Diagram Documents	09364	4/17/90

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS****TITLE:   SAMPLE OF SPECIFICATIONS TITLE  
PAGE****DATE:   August 1998****APPENDIX E**

## **Appendix E**

### **Sample of Specifications Title Page**

**DOE-ID ARCHITECTURAL  
ENGINEERING STANDARDS**

**TITLE: SAMPLE OF SPECIFICATIONS TITLE**

**PAGE**

**DATE: August 1998**

**APPENDIX E**

Document ID :

SPC-

Date:

Revision :

**IDAHO NATIONAL ENGINEERING AND  
ENVIRONMENTAL LABORATORY**

# **A-E CONSTRUCTION SPECIFICATION**

**SUBCONTRACT NO. S97-**

**PROJECT FILE NO. 020XXX**

**PROJECT TITLE**

**APPROVED FOR CONSTRUCTION**

Prepared for:  
U.S. Department of Energy  
Idaho Operations Office  
Idaho Falls, Idaho

**LOCKHEED MARTIN**

## **Appendix F**

### **AE Specification Approval Signature Sheet**

**Instructions:** INEL Forms L-0431.28# and L-0431.29# are the formats designated for AE specification approval signature sheets. Customized company forms may be used if they provide the same salient features as the INEL Forms.

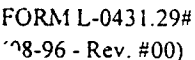


# A-E SPECIFICATION APPROVAL SIGNATURE SHEET

FORM L-0431.28#  
(8-96 - Rev. #00)

Page \_\_\_\_\_ of \_\_\_\_\_

Specification Number		Subcontract Number		
Title				
Prepared by: _____ Name Address Ext. Date				
Prepared for: _____				
Rev.	Date	Description	Signatures	Date
			<u>A-E</u> Prepared by: _____ Checked by: _____ Approved by: _____ <u>Requester</u> Approved by: _____	
			<u>A-E</u> Prepared by: _____ Checked by: _____ Approved by: _____ <u>Requester</u> Approved by: _____	
			<u>A-E</u> Prepared by: _____ Checked by: _____ Approved by: _____ <u>Requester</u> Approved by: _____	
			<u>A-E</u> Prepared by: _____ Checked by: _____ Approved by: _____ <u>Requester</u> Approved by: _____	



## type of Document:

Document No.:

**Project File No.:**

**Title:**

Prepared By:

**Ext.:**

Originated By:

**Ext.:**

[illegible]

## **Appendix G**

### **Justification Statement for Sole Source Procurements**



# Justification Statement for Sole Source Procurements

## I. Description of Supplies or Services to be Procured

- A. A brief, general description and statement of the general application and particular significance or specialized character of the procurement.
- B. A description of all associated supplies or services (e.g., technical data, reports, engineering services) to be procured.

## II. Item History, Estimated Future Requirements, and Long Range Procurement Objectives:

- A. Brief statement of the technical evolution of the supplies or services being procured from initiation to present status.
- B. Brief statement as to whether the work is a continuation of previous efforts performed by the proposed subcontractor/supplier.
- C. Reference should be made to any advance planning information previously prepared or furnished, together with information with respect to any changes proposed in the present justification which represents a departure or modification of prior procurement plans, including a statement of the effect of the changes, if any, on scheduled milestones.
- D. Brief statement as to what actions have been taken to develop competition and eliminate a noncompetitive situation in future procurements of the proposed supplies or services.

## III. Estimated Cost:

- A. The estimated cost of the procurement and a brief description of assumptions made and data used to develop the estimate.
- B. The estimated cost listed by fiscal years.
- C. Whether the proposed subcontractor/supplier or the Government have a substantial investment of some kind that would have to be duplicated at Government expense by another source.

## IV. Schedule Requirements:

- A. The basis for establishing schedule requirements.
- B. An explanation of the urgency, if any, of the requirement. Describe why the schedules are crucial and why only the proposed subcontractor/supplier can meet them.
- C. Describe what significant cost savings or other benefits could result if schedules could be relaxed and whether competition could thus be obtained.

**V. Exclusive Capability:**

- A. Does the proposed subcontractor/supplier have personnel considered unquestionably predominant experts in the particular field?
- B. What prior existence of a highly specialized nature does the source exclusively possess that is vital to the proposed effort?
- C. What facilities and/or test equipment does the source exclusively have that are complex or specialized and vital to the effort?
- D. Is competition precluded because of the existence of patent rights, copyrights, secret processes, trade secrets, technical data, or other proprietary data?
- E. What other capability and/or capacity does the proposed subcontractor/supplier have that is necessary for the specific effort and makes it clearly the only source that can perform the work on the required time schedule without incurring clearly unreasonable costs?

**VI. Other:**

- A. If lack of drawings or specifications are a constraining factor, why is the proposed subcontractor/supplier clearly best able to perform under these circumstances? Why are the drawings and specifications lacking? What is the lead time required to get drawings and specifications suitable for competition?
- B. Are parts of components being procured as replacement parts in support of equipment specially designed by a manufacturer, where data available is not adequate to assure that the parts or components obtained from another source would perform the same function?
- C. Sole Source Justification Form, EG&G 723 Rev 10/91.

## **Appendix H**

### **Vendor Data Schedule**

#### **Instructions:**

Use INEL Form L-0431.14#.

INEL FORM  
L-0431.14#  
(12-96 - Rev. #01)

**Project Title:**

**Prepared By:**

[illegible]

- Instructions:**
1. Refer to General Provisions, Special Conditions, and Specification for instructions on submittals.
  2. A number preceding the Vendor Data Code indicates number of submittal copies.
  - \*3. An X in this column indicates that the item must be examined/approved by the contractor prior to use.

DECEMBER 30, 1998

**APPENDIX I**  
**LIST OF AVAILABLE GUIDE SPECIFICATIONS**

<u>SECTION</u>	<u>DOWNLOAD</u>	<u>TITLE</u>
<u>DIVISION 1--GENERAL REQUIREMENTS</u>		
01005	PDF	WORD SUMMARY OF WORK
01051	PDF	WORD CONSTRUCTION SURVEYING AND STAKING
01300	PDF	WORD SUBMITTALS
01522	PDF	WORD TEMPORARY ENCLOSURES
01524	PDF	WORD TEMPORARY WORK PLATFORM
<u>DIVISION 2--SITE WORK</u>		
02010	PDF	WORD SUBSURFACE INVESTIGATION
02020	PDF	WORD GEOTECHNICAL TESTING AND REPORTS
02050	PDF	WORD DEMOLITION
02062	PDF	WORD DEMOLITION AND REPAIRS
02064	PDF	WORD ASBESTOS ABATEMENT
02200	PDF	WORD EARTHWORK
02430	PDF	WORD CULVERTS
02444	PDF	WORD CHAINLINK FENCING
02452	PDF	WORD SIGNAGE
02486	PDF	WORD REVEGETATION
02513	PDF	WORD ASPHALT CONCRETE PAVING
02514	PDF	WORD ASPHALT CONCRETE PATCHING
02574	PDF	WORD PAVEMENT CRACK SEALING
02575	PDF	WORD ASPHALT SLURRY SEAL
02576	PDF	WORD PAVEMENT SEALING
02598	PDF	WORD POND LINERS
02710	PDF	WORD UNDERGROUND PROCESS PIPING SYSTEMS
02713	PDF	WORD UNDERGROUND POTABLE WATER SYSTEM
02722	PDF	WORD SANITARY SEWER PIPING
02723	PDF	WORD WASTE WATER SYSTEM
02850	PDF	WORD RAILROAD WORK
<u>DIVISION 3--CONCRETE</u>		
03010	PDF	WORD CONCRETE
03100	PDF	WORD CONCRETE FORMWORK
03200	PDF	WORD CONCRETE REINFORCEMENT
03300	PDF	WORD CAST IN PLACE CONCRETE
03301	PDF	WORD CAST IN PLACE CONCRETE (SHORT FORM)
03310	PDF	WORD READY-MIXED CONCRETE
03400	PDF	WORD PRECAST CONCRETE
03410	PDF	WORD PRECAST CONCRETE PANELS
03420	PDF	WORD PRESTRESSED CONCRETE
03600	PDF	WORD GROUT
<u>DIVISION 4--MASONRY</u>		
04220	PDF	WORD CONCRETE MASONRY UNITS

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<u>SECTION</u>	<u>DOWNLOAD</u>	<u>TITLE</u>
<u>DIVISION 5--METALS</u>		
05060	PDF WORD	STRUCTURAL WELDING
05061	PDF WORD	CARBON STEEL STRUCTURAL WELDING
05062	PDF WP	SHEET METAL WELDING
05100	PDF WORD	STRUCTURAL STEEL AND MISCELLANEOUS METALS
05101	PDF WORD	STAINLESS STRUCTURAL STEEL AND FASTENERS
05310	PDF WORD	STEEL DECKING
05400	PDF WORD	LIGHT GAGE METAL FRAMING
<u>DIVISION 6--CARPENTRY</u>		
06100	PDF WORD	CARPENTRY
<u>DIVISION 7--THERMAL AND MOISTURE PROTECTION</u>		
07140	PDF WORD	POLYURATHANE FOAM INSULATION
07190	PDF WORD	VAPOR BARRIERS
07200	PDF WORD	THERMAL INSULATION
07240	PDF WORD	EXTERIOR WALL INSULATION AND FINISH SYSTEM
07270	PDF WORD	FIRESTOP MATERIAL
07511	PDF WORD	BUILT-UP ASPHALT ROOFING
07531	PDF WORD	SINGLE-PLY MEMBRANE ROOFING
07550	PDF WORD	INVERTED ROOFING BUILT-UP MEMBRANE ASSEMBLY
07551	PDF WORD	INVERTED SINGLE PLY MEMBRANE ROOFING ASSEMBLY
07610	PDF WORD	PERFORMED STEEL SIDING AND ROOFING
07901	PDF WORD	JOINT SEALANTS
<u>DIVISION 8--DOOR AND WINDOWS</u>		
08110	PDF WORD	STEEL DOORS AND FRAMES
08210	PDF WORD	FLUSH WOOD DOORS
08318	PDF WORD	COUNTER BALANCED MECHANICAL BOLLARD
08350	PDF WORD	FOLDING DOORS
08362	PDF WORD	INSULATED SECTIONAL OVERHEAD DOOR
08700	PDF WORD	DOOR HARDWARE
08800	PDF WORD	GLASS AND GLAZING
08905	PDF WORD	WINDOW WALL
<u>DIVISION 9--FINISHES</u>		
09250	PDF WORD	GYPSUM DRYWALL
09300	PDF WORD	CERAMIC TILE
09510	PDF WORD	ACOUSTICAL CEILINGS
09650	PDF WORD	RESILIENT FLOORING
09680	PDF WORD	CARPET
09701	PDF WORD	RESINOUS FLOORING

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<u>SECTION</u>	<u>DOWNLOAD</u>	<u>TITLE</u>
09800	PDF WORD	DECONTAMINABLE COATINGS
09810	PDF WORD	CHEMICAL RESISTANT COATING SYSTEM
09900	PDF WORD	PAINTING
09910	PDF WP	PAVEMENT MARKINGS
09950	PDF WORD	WATER TANK PAINTING

DIVISION 10--SPECIALTIES

10160	PDF WORD	TOILET PARTITIONS
10440	PDF WORD	LETTERS
10500	PDF WORD	METAL LOCKERS
10601	PDF WORD	WIRE MESH PARTITIONS
10670	PDF WORD	METAL SHELVING/WORK BENCHES
10800	PDF WORD	TOILET ACCESSORIES

DIVISION 13--SPECIAL CONSTRUCTION

13120	PDF WORD	METAL BUILDING
13715	PDF WORD	NON-RICOCHET BALLISTIC ARMOR

DIVISION 15--MECHANICAL

15014	PDF WP	WELDING
15024	PDF WP	PRESSURE PIPING/VESSEL WELDING
15175	PDF WP	UNDERGROUND STORAGE TANKS (UST)
15400	PDF WP	PLUMBING AND SERVICE PIPING
15401	PDF WP	UNDERGROUND PIPING AND PLUMBING SYSTEMS
15404	PDF WP	PROCESS PIPING
15480	PDF WP	STERILIZATION OF WATER PIPING
15501	PDF WORD	WET PIPE FIRE PROTECTION SYSTEM
15502	PDF WP	FIRE PROTECTION HALON SYSTEM
15503	PDF WP	DELUGE FIRE PROTECTION SYSTEM
15504	PDF WP	PREACTION FIRE PROTECTION SYSTEM
15505	PDF WP	UNDERGROUND FIRE PROTECTION PIPING
15506	PDF WP	ON-OFF MULTICYCLE PREACTION FIRE SUPPRESSION SYSTEM
15507	PDF WP	DRY PIPE FIRE PROTECTION SYSTEM
15600	PDF WP	TESTING PROCESS PIPING
15800	PDF WORD	HEATING AND COOLING SYSTEM
15801	PDF WP	AIR DISTRIBUTION SYSTEM
15883	PDF WP	HEPA FILTER HOUSINGS
15980	PDF WORD	TESTING, ADJUSTING, AND BALANCING

DIVISION 16--ELECTRICAL

16000	PDF WORD	ELECTRICAL GENERAL PROVISIONS
16109	PDF WP	SWITCHES, RECEPTACLES AND WALL PLATES
16110	PDF WP	ELECTRICAL RACEWAYS
16120	PDF WORD	CABLE, WIRE, CONNECTORS, AND MISCELLANEOUS DEVICES
16123	PDF WP	FIBEROPTIC CABLE INSTALLATION
16124	PDF WP	MEDIUM VOLTAGE CABLE AND CONNECTORS

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APPENDIX I  
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<u>SECTION</u>	<u>DOWNLOAD</u>	<u>TITLE</u>
16155	PDF WP	MOTOR STARTERS
16160	PDF WP	PANELBOARDS
16170	PDF WP	UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS)
16360	PDF WP	DISCONNECT SWITCHES 600 V AND LESS
16413	PDF WP	5 KV AND 15 KV CIRCUIT BREAKER METAL CLAD SWITCHGEAR
16450	PDF WP	GROUNDING
16460	PDF WP	TRANSFORMERS, GENERAL LIGHTING AND DISTRIBUTION DRY TYPE, INDOOR AND OUTDOOR, UNDER 600 VOLTS
16461	PDF WP	TRANSFORMER, PAD MOUNTED, DRY TYPE, POWER
16462	PDF WP	TRANSFORMER, PAD MOUNTED, OIL FILLED, POWER
16500	PDF WP	LIGHTING
16603	PDF WP	AUTOMATIC TRANSFER SWITCH
16604	PDF WORD	AUTOMATIC TRANSFER SWITCH, DELAYED TRANSITION TYPE
16610	PDF WP	TELEPHONE SYSTEM
16640	PDF WP	CATHODIC PROTECTION
16650	PDF WP	LIGHTNING PROTECTION
16721	PDF WORD	FIRE ALARM AND SUPERVISORY (FA) SYSTEM
16725	PDF WORD	EMERGENCY NOTIFICATION SYSTEM
16919	PDF WP	LOW VOLTAGE SWITCHGEAR
16920	PDF WP	MOTOR CONTROL CENTERS



<b>DOE-ID ARCHITECTURAL ENGINEERING STANDARDS</b>	<b>TITLE: SURVEYING CONTROL ON THE INEEL</b>	
	<b>DATE: December 1998</b>	<b>SECTION: APPENDIX J</b>

## **J-1. RECOMMENDATIONS**

- 1.1 The official horizontal datum of the United States is the North American Datum of 1983 (NAD83). The official vertical datum of the United States is the North American Vertical Datum of 1988 (NAVD88). Also, Chapter 17 of Title 55 of the Idaho Code requires that NAD83 be used after January 1, 1996. Therefore, it is recommended that all survey data on the INEEL site be reported in NAD83 and NAVD88.
- 1.2 Exceptions that may require the use of other datums:
  - Most Geographic Information System (GIS) data currently in the Environmental Restoration Information System (ERIS) is in North American Datum of 1927 (NAD27), Idaho East Zone, state plane coordinates for horizontal data and National Geodetic Vertical Datum of 1929 (NGVD29) for vertical data.
  - Current RWMC facility drawings are based on what is known as "RWMC Project Coordinates".
  - Other facilities may have similar "Site Specific" datums.
- 1.3 It is imperative that the person(s) performing survey work coordinate the survey with the requestor and with the proper facility manager so that the appropriate datums will be used.
- 1.4 Because of all the various horizontal and vertical datums that have been used on the INEEL, it is imperative that care is exercised when using any coordinates or elevations. Coordinates and latitudes/longitudes shall always be referenced to the appropriate horizontal datum (NAD27, NAD83, NAD83(1992), Universal Transverse Mercator (UTM), project, site specific, etc). Elevations shall always be referenced to the appropriate vertical datum (NAVD88, NGVD29, site specific, etc.)
- 1.5 The instrumentation used to obtain the coordinates/elevations shall be indicated (conventional level, total station, uncorrected handheld GPS receiver with error of 100 meters, corrected mapping grade GPS receivers with error of a few feet, corrected geodetic GPS receivers with error of only 1 cm, etc.) Also, some indication of accuracy or closure shall be included with survey data.

## **J-2. HISTORY AND BACKGROUND**

- 2.1 Several contractors have performed survey work in the past on the INEEL site (EG&G, F.C. Torkelson Company, E.B. Steel, MK-Ferguson of Idaho, WINCO, and LMITCO). Various vertical and horizontal datums have also been used in the past for survey data on the INEEL.
- 2.2 About 1950, several horizontal reference points were established on the INEEL by the Corps of Engineers. These points were based on NAD27, state plane coordinates. Survey crews on the INEEL used these reference points at each specific facility (TAN, RWMC, CFA, etc.) but did not always properly convert distances so that the coordinates thus derived were not true state plane coordinates. Consequently, each facility tended to have a "site specific" horizontal datum that didn't correlate with datums at other facilities.
- 2.3 In 1990, the National Geodetic Survey (NGS) used Global Positioning System (GPS) equipment to establish First-order horizontal surveying control at nine monuments on or near the INEEL Site. Table 1 below gives the coordinates of the nine control points as

<b>DOE-ID ARCHITECTURAL ENGINEERING STANDARDS</b>	<b>TITLE: SURVEYING CONTROL ON THE INEEL</b>	
	<b>DATE: December 1998</b>	<b>SECTION: APPENDIX J</b>

established by NGS. Coordinates are given in NAD83, Idaho East Zone, State Plane Coordinates, feet. Map #1 shows the approximate locations of the monuments. Data sheets for these nine control monuments are available from Facility Engineering and also from NGS.

Table 1 – INEEL MONUMENTS

MONUMENT NAME	NORTHING	EASTING
AEC	703784.278	448659.329
BIG BUTTE 3	631347.533	428458.264
BIRCH	836211.569	500690.357
CIRCULAR	788888.088	533042.660
COBBLE	672006.282	456280.698
CRATER	703015.599	396305.661
GRAFTON	729382.587	420922.006
S 58	652889.242	446532.581
SPLIT	648297.565	531865.245

- 2.4 About 1940, the U.S. Coast and Geodetic Survey (USC&GS) established some vertical control on the INEEL site. This vertical datum was known as NRTS (Naval Reactor Test Station). Each site had a site specific vertical datum based somewhat on this datum but not necessarily properly tied together. About 1965, another survey was performed by the USC&GS, which lowered the bench mark used to establish the NRTS elevations. This datum is referred to as the USGS datum.
- 2.5 During the summer of 1992, NGS personnel established First-order, Class II vertical surveying control at about 400 benchmarks on or near the INEEL Site with conventional leveling equipment. The vertical survey control effort was divided into seven lines (see Map #2) as follows:
- 2.6 Line 1 – Began in Blackfoot and proceeded westerly along the Union Pacific Railroad bed to Arco.
- 2.7 Line 2 – Began in Arco and proceeded easterly along Highway 20/26 through Butte City to the junction of Highways 20/26 and 22/33. Thence proceeded northerly along Highway 22/33 to Howe. Thence proceeded easterly along Highway 22/33 to the junction of Highways 22 and 33.
- 2.8 Line 3 – Began on Highway 22/33 about 1.5 miles south of Howe and proceeded easterly along dirt road about 3 miles. Thence proceeded southeasterly along dirt roads T-14 and T-5 to Lincoln Boulevard north of NRF. Thence proceeded southerly along Lincoln past NRF, TRA, and INTEC to CFA. Thence proceeded westerly along West Portland Avenue. Thence proceeded southwesterly along Van Buren Boulevard to EBR-1. Thence proceeded southwesterly along Adams to RWMC area. Also included a spur from INTEC to the proposed NPR site.
- 2.9 Line 4 – Began at CFA and proceeded southerly along Main Street to State Highway 20/26. Thence proceeded easterly along Highway 20/26 to its intersection with East Portland Avenue. Then proceeded northwesterly along East Portland to its intersection with Jefferson Boulevard. Thence proceeded northeasterly along Jefferson to its intersection

<b>DOE-ID ARCHITECTURAL ENGINEERING STANDARDS</b>	<b>TITLE: SURVEYING CONTROL ON THE INEEL</b>	
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with Wilson Boulevard. Thence proceeded easterly then southerly along Wilson to its intersection with Highway 20/26. Thence proceeded easterly along Highway 20/26 to its intersection with dirt road T-21. Thence proceeded northerly along dirt road T-21, T-4, T-9, and other dirt roads to Highway 33. Thence proceeded easterly along Highway 33 past Mud Lake and Terreton to Sage Junction. Thence proceeded southerly along Interstate 15 to Roberts.

- 2.10 Line 5 – Began at the intersection of Taylor Boulevard with Highway 20 and proceeded northerly along Taylor to its intersection with Harrison Boulevard near ANL. Thence proceeded northwesterly along Harrison to its intersection with dirt road T-25. Thence proceeded northerly along T-25 to the intersection of Lines 4 and 7.
- 2.11 Line 6 – Began in Roberts and proceeded southerly along Interstate 15 to Idaho Falls.
- 2.12 Line 7 – Began at the intersection of Highways 22 and 28 and proceeded southerly along Highway 22 to its intersection with Highway 33 and dirt road T-27. Thence proceeded northeasterly along T-27 to its intersection with Lincoln Boulevard. Thence proceeded southerly along Lincoln to a dirt road about ½ mile past the INEEL guard station. Thence proceeded easterly then northerly along dirt roads to Highway 33. Thence proceeded northerly along dirt road T-17 to Highway 28. Thence proceeded northwesterly along Highway 28 to the point of beginning.
- 2.13 At the conclusion of their surveying effort, NGS provided:
- a series of marked-up USGS quad maps showing the approximate locations of the level lines and vertical benchmarks.
  - descriptions of the benchmarks and how to get to each one.
  - two tables. One giving the elevations of the benchmarks in NAVD 88 and one in NGVD 29.

The marked-up USGS maps, descriptions, and tables are available from Facility Engineering and also from NGS.

- 2.14 In 1997, horizontal positions of about 160 of the NGS vertical benchmarks were determined with GPS equipment by LMITCO. The positions are provided in the following two tables. The horizontal datum is NAD83, Idaho East Zone, State Plane Coordinates, feet. The vertical datum is NGVD 88, feet. Horizontal positions were determined with Ashtech Z-12 geodetic GPS receivers and Ashtech PRISM PNAV post-processing software. The Ashtech GPS receivers and software have a published horizontal accuracy of 1 cm +/- 1 ppm of baseline length. In Table 2, coordinates of AEC and Cobble were fixed during post-processing. In Table 3, coordinates of Circular and Birch were fixed during post-processing. Elevations were determined with conventional leveling equipment by NGS in 1992. Elevations are First-Order, Class II accuracy. Map #3 shows the approximate locations of the benchmarks that were surveyed.

Table 2 – AEC AND COBBLE CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION
7	679160.865	449249.493	4933.96
5 A	738982.924	455542.807	4818.94

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Table 2 – AEC AND COBBLE CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION
8 A	680717.096	448560.230	4949.08
8 C	679592.451	449929.183	4935.19
AEC	703784.278	448659.329	4956.65
H2O	673530.704	433454.711	5036.14
MID	675921.731	495010.011	5298.39
Z 430	668283.183	422674.284	5013.74
A 431	671812.133	429785.250	5021.82
B 431	680395.814	438236.595	4983.43
C 431	684370.458	443090.102	4957.26
D 431	682540.771	449650.572	4936.92
E 431	688765.881	450310.602	4931.04
F 431	692400.505	453580.639	4917.03
G 431	700107.376	466268.344	4919.03
H 431	694003.138	458155.697	4909.59
J 431	698427.559	468211.786	4934.63
K 431	699611.804	461259.550	4897.67
L 431	694321.202	451445.900	4920.24
M 431	698385.332	447084.300	4925.30
N 431	699772.117	443657.056	4932.19
P 431	702354.003	450830.703	4907.92
Q 431	710186.570	453933.081	4881.75
R 431	717399.747	457302.410	4861.53
S 431	721795.128	457875.828	4854.54
T 431	722265.386	461540.773	4850.33
U 431	727654.507	467336.557	4837.11
V 431	734799.485	463159.797	4831.30
W 431	738355.013	457028.113	4821.27
X 431	740566.645	452775.409	4817.29
Y 431	740731.484	448577.728	4831.62
Z 431	742155.973	447307.388	4842.68
A 432	746589.159	446722.222	4826.41
B 432	753619.021	446088.819	4819.63
C 432	756164.820	445179.209	4816.89
D 432	760257.895	442446.833	4804.35
E 432	761905.549	438191.314	4827.97
J 432	683978.686	525129.090	5276.90
K 432	686317.143	526007.213	5235.90
L 432	691810.091	526795.379	5185.32
M 432	696862.478	525810.925	5182.11
N 432	703934.086	525118.932	5131.79
P 432	708720.196	523232.350	5113.42
B 433	675640.451	463320.301	4934.65
C 433	683289.033	468456.257	4912.33
D 433	681323.230	472922.789	4993.04
E 433	680685.656	479510.479	5053.25
F 433	675714.246	481449.476	5053.95
4936	671386.946	464357.781	4939.46

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Table 2 - AEC AND COBBLE CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION
COBBLE AZ MK	672705.380	453320.504	4951.18
COBBLE	672006.282	456280.698	4967.08
DRIFT AZ MK	680868.660	516603.640	5286.77
DRIFT	679714.656	513525.464	5316.81
24 FMK	671735.978	461031.043	4943.55
25 FMK	671073.021	465500.148	4934.95
28 FMK	671318.344	481809.070	4995.72
29 FMK	672358.948	489170.233	5089.75
30 FMK	673108.739	494916.817	5180.70
31 FMK	675358.342	501323.037	5223.63
32 FMK	677911.387	508269.495	5267.84
33 FMK	683086.900	522324.809	5256.23
4 HLS	674535.698	446604.915	4959.28
NRTS	679567.101	449892.706	4934.56
RWMC NORTH	670700.158	422189.801	5061.05
RWMC SOUTH	667529.654	422207.697	5024.30

Table 3 - CIRCULAR AND BIRCH CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION
C 57	846561.574	507507.295	5118.86
D 57	843811.145	510685.820	5059.34
E 57	840618.810	514163.832	4997.75
F 57	837189.862	518250.914	4935.87
H 34	842104.560	509946.918	5055.62
H 57	823849.690	533497.894	4796.41
L 34	816863.047	491532.668	4952.66
M 34	807522.694	487118.096	4954.17
P 34	785679.887	481885.765	4816.84
Q 34	777170.614	475616.180	4815.23
V 56	817089.618	541315.328	4794.26
W 56	820464.754	537103.388	4796.03
X 56	826569.536	530169.896	4803.43
Y 56	830314.559	525878.527	4841.61
A 430	792867.911	528217.295	4848.47
B 430	796702.313	531215.020	4881.80
C 430	800231.033	533120.696	4825.66
D 430	804262.301	535407.218	4865.23
E 430	805722.040	536532.159	4872.67
F 430	809524.073	538806.815	4803.89
G 430	814860.648	541237.854	4808.28
H 430	834007.374	521906.898	4884.84
J 430	835938.814	501273.800	5126.94
K 430	832004.045	499752.288	5061.12
L 430	825957.086	497112.819	4999.50
M 430	819623.072	493783.306	4940.87

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Table 3 - CIRCULAR AND BIRCH CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION
N 430	814395.193	491443.057	4939.41
P 430	807064.498	487761.306	4951.61
Q 430	782314.162	479353.956	4893.09
R 430	790057.235	507799.745	4784.50
S 430	764128.271	505281.720	4815.81
T 430	760775.390	510174.192	4828.84
U 430	764700.764	512559.180	4814.78
V 430	769577.476	515260.440	4804.24
W 430	773547.166	520310.524	4799.13
S 430	775369.223	524445.812	4794.97
Y 430	797264.782	508866.207	4781.88
Y 432	758086.548	523522.330	4768.18
Z 432	764426.031	523818.684	4789.76
A 433	769023.377	524034.539	4792.35
Z 433	766812.788	559561.809	4796.22
A 434	770578.753	558376.655	4790.76
B 434	770148.529	552533.990	4799.17
C 434	768054.571	548807.138	4791.16
D 434	771076.802	544073.672	4790.14
E 434	772237.561	539406.654	4790.42
F 434	775887.352	535693.282	4791.42
G 434	779076.299	530730.815	4789.02
H 434	781533.373	525851.495	4790.05
J 434	776907.211	526257.996	4796.15
K 434	785397.445	526488.948	4807.09
L 434	788998.257	526834.551	4866.64
M 434	790454.003	531688.379	4965.25
N 434	792432.434	530533.965	4877.46
P 434	792892.167	548020.199	4785.92
Q 434	792823.455	562599.806	4788.03
R 434	792800.876	568505.459	4787.49
S 435	779734.447	476167.612	4896.93
T 435	778910.337	472605.558	4795.81
AMA 2	794654.184	514607.889	4792.64
BANK	799787.039	506821.081	4798.01
BEND	792977.935	516771.120	4790.64
BIRCH AZ MK	838249.098	503107.793	5081.86
BIRCH	836211.569	500690.357	5160.73
CENTER	786941.691	508962.223	4798.43
CURCULAR	788888.089	533042.660	5068.05
49 HLS	782289.654	484260.356	4792.70
50 HLS	784078.151	489658.531	4791.85
51 HLS	785947.993	495378.800	4790.03
52 HLS	787356.926	499636.681	4790.82
53 HLS	789321.054	505656.419	4787.40
54 HLS	790798.524	510155.214	4793.74
55 HLS	792079.830	513923.496	4791.66

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Table 3 - CIRCULAR AND BIRCH CONTROL POINTS

CONTROL POINT	NORTHING	EASTING	ELEVATION
56 HLS	788639.048	510963.824	4791.90
57 HLS	785349.572	507637.174	4788.89
58 HLS	780372.661	505217.942	4791.96
59 HLS	774980.732	502276.681	4811.79
60 HLS	770483.030	499846.802	4815.37
61 HLS	765818.175	497329.282	4799.36
64 HLS	792806.287	558303.321	4787.80
65 HLS	792710.653	551140.837	4787.03
66 HLS	792741.354	545772.959	4784.45
67 HLS	792829.623	538955.200	4790.87
68 HLS	793541.858	533772.763	4881.76
NATURAL RM 2	823798.865	533516.284	4796.65
NATURAL	823825.238	533486.333	4796.62
T6N R30E SECS 12 13 CC	798583.612	485364.946	4924.39
RTE 22 STA 464+41.54 100RT	780888.619	479852.109	4816.88
RTE 22 STA 484+53.32 100RT	782812.141	480374.383	4802.78
RTE 22 STA 594+61.50 100LF	793332.440	483399.539	4897.00
RTE 22 STA 710+07.83 100RT	804303.205	487036.424	4960.39
RENO 2	846629.136	507461.433	5119.59
RENO 2 RM 3	846552.195	507349.040	5121.12
RIDGE	794990.183	513767.750	4802.90
TEAT AZ MK	766028.777	500145.927	4791.59

**J-3. OFFICIAL HORIZONTAL DATUMS**

- 3.1 NAD27:** The North American Datum of 1927 was based on the Clarke ellipsoid of 1866, which modeled the earth as an oblate spheroid (an ellipse rotated around its short axis). Many NAD27 control coordinates were based on measurements and observations made in the 1800's. The errors introduced then are known and recognized today. NAD27 errors vary from station to station.
- 3.2 NAD83:** The North American Datum of 1983 is based on the geocentric ellipsoid known as GRS 80, which includes corrections such as geoid reduction and vertical deflection. Using this spheroid causes the location of the earth's center to change, thereby changing surface locations of all latitude/longitude values (as compared to NAD27). This datum is considered more accurate than NAD27 because it is based on both earth and satellite observations.
- 3.3 NAD83 (1992):** In 1992, the NGS performed a new adjustment of the NAD83 datum which is known as the NAD83(1992) datum.

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#### **J-4. OFFICIAL VERTICAL DATUMS**

- 4.1 NAD27: The North American Datum of 1927 was based on the Clarke ellipsoid of 1866, which modeled the earth as an oblate spheroid (an ellipse rotated around its short axis). Many NAD27 control coordinates were based on measurements and observations made in the 1800's. The errors introduced then are known and recognized today. NAD27 errors vary from station to station.
- 4.2 NGVD29: The National Geodetic Vertical Datum of 1929 is based on earth measurements taken in the late 1800's and early 1900's. It represents height above mean sea level.
- 4.3 NAVD88: The North American Vertical Datum of 1988 also represents height above mean sea level, but is considered more accurate than NGVD29 because it is based on earth and satellite observations taken in recent years. NAVD88 is about 3.5 feet higher than NGVD29 in the vicinity of the INEEL site.

#### **J-5. UNOFFICIAL DATUMS**

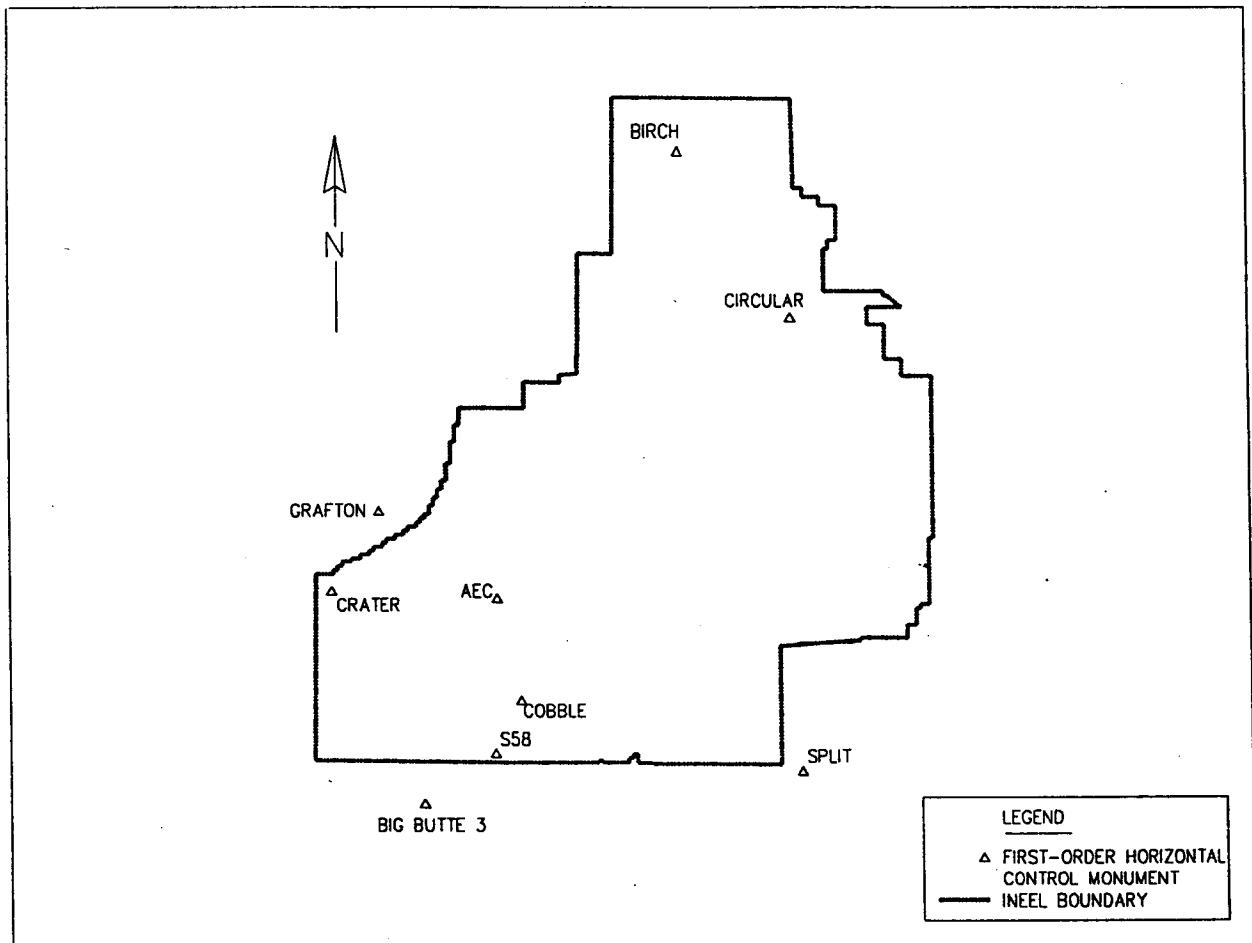
- 5.1 Site Specific Coordinates: Each facility has had "site specific" horizontal and vertical datums in the past. For instance, RWMC had a site specific datum that was based on two control points – RWMC North and RWMC South. Those two monuments were assumed to be due north and south of each other and the distance between them was ground distance.
- 5.2 Project Coordinates: "Project coordinates based on state plane" are obtained by multiplying NAD27, Idaho East Zone, state plane coordinates by a combined grid factor. This combined grid factor is a multiple of the sea level factor and the scale factor. Inversing between project coordinates will give true ground distance. (Inversing between state plane coordinates will not give true ground distance.)
- 5.3 The problem with "project coordinates" and "site specific coordinates" is that the coordinates "look" like state plane coordinates and can easily cause confusion. If coordinates from these three systems are mixed, major errors can occur.

#### **J-6. STATE PLANE COORDINATE ZONES**

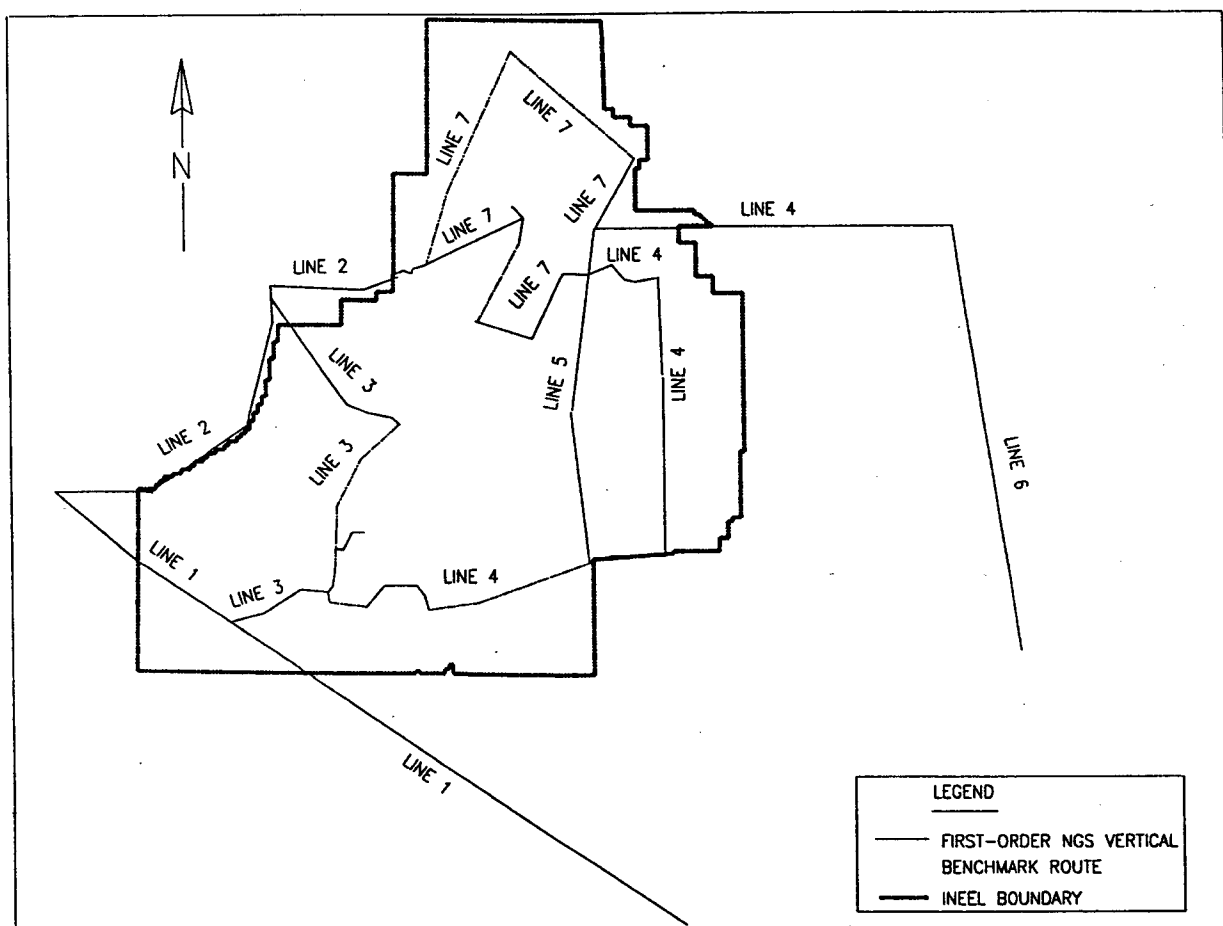
- 6.1 The INEEL has portions of 5 counties: Bingham, Bonneville, Clark, Jefferson, and Butte. All of these except Butte County are officially in the Idaho east zone. Butte County is in the Idaho central zone and makes up much of the site, but the Idaho east zone is used for most data on the INEEL.



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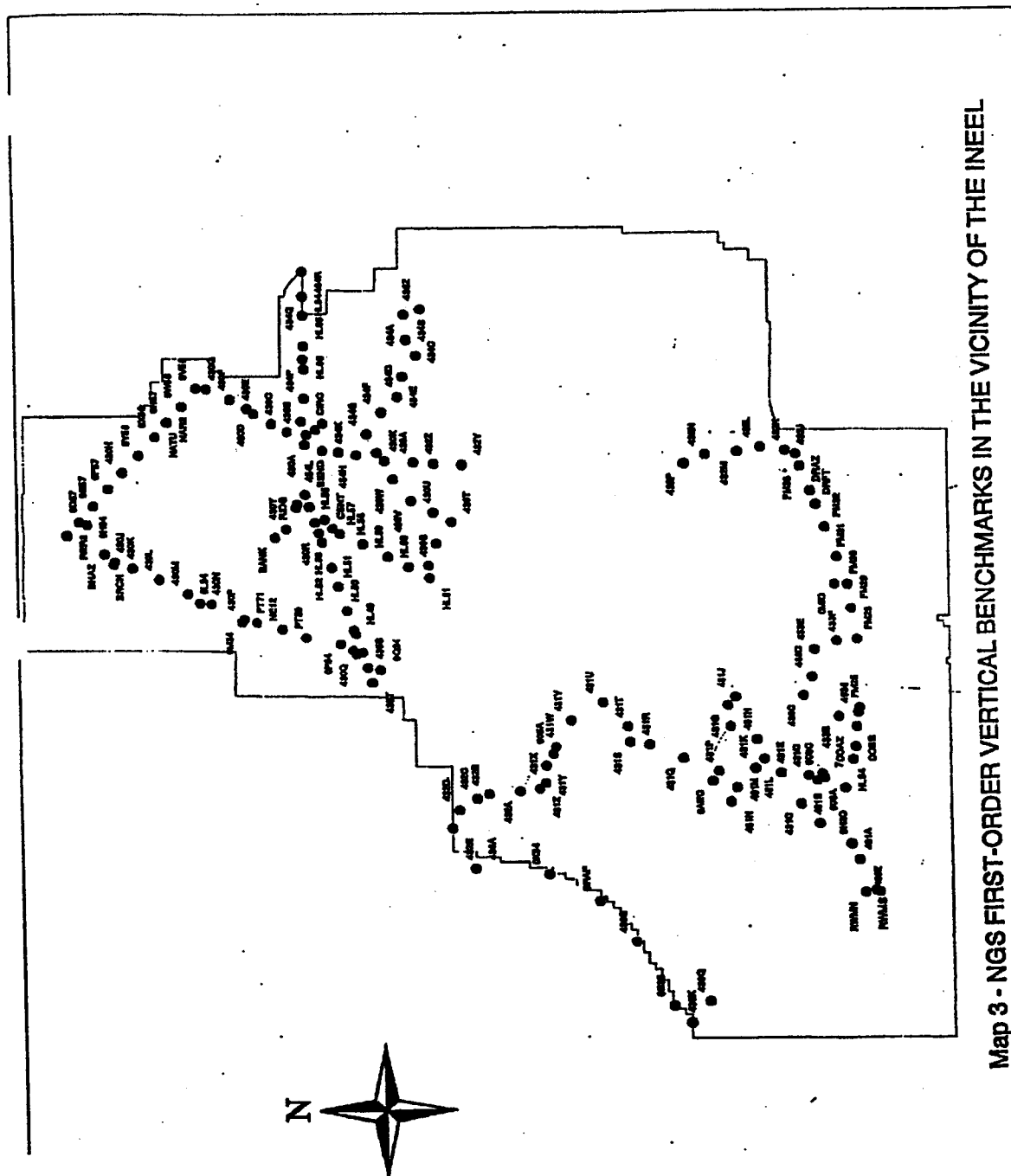
Map 2 - FIRST-ORDER VERTICAL SURVEYING CONTROL IN THE VICINITY OF THE INEEL SITE

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**K-1. CODES AND STANDARDS****1.1 Applicable Codes and Standards**

- DOE STD 1088, Fire Protection for Relocatable Structures

**1.2 Referenced Codes and Standards**

- 29 CFR 1910, Occupational Safety & Health Standards
- DOE-ID AES, Architectural Engineering Standards
- NFPA 70, National Electrical Code (NEC)
- UBC, Uniform Building Code

**K-2. GENERAL INFORMATION**

**2.1** This standard has been developed for trailers, portable structures and modular buildings, manufactured structures, mobile homes, semi-trailers, factory assembled structures, cargo containers, hazardous materials or flammable liquids storage containers, air support/inflated structures, tent/membrane and cloth/rib structures used at DOE-ID facilities or under DOE-ID direction. This standard shall also apply to temporary or non-permanent structures not encompassed by other DOE criteria.

**2.2** This standard does not apply to relocatable structures that will remain in place not more than 180 days and which have no significant fire hazards, no programmatic importance, and no significant value as determined by the cognizant fire protection engineer and other applicable safety representative. All utilities for nonapplicable structures shall be removed as part of the structure removal.

**Exception:** Utility systems may remain in place if their design and construction complies with the AES and their location is documented in the INEEL drawing system.

**2.3** Modular buildings or similar semi-permanent relocatable structures documented to be in use from more than 126 months shall comply with the requirements of the AES.

**2.4** DOE STD 1088 and Section 3.0 of this standard apply to all applicable structures. This includes the temporary units used by construction contractors, where no DOE property is at risk, unless the unit is onsite for less than 180 days. The regulations, codes and standards listed in DOE STD 1088 are applicable as referenced therein except as amended herein. Requirements in DOE STD 1088 are not repeated in this standard.

**Exceptions:** Modular buildings or similar structures documented to be in use for more than 6 months shall comply with the requirements of the AES.

DOE O 6430.1A has been canceled and is no longer applicable.

**2.5** Section 4.0, Specific Requirements To Meet Improved Risk Criteria, of this standard applies to those units needing a higher level of protection as required by the

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ENGINEERING STANDARDS**

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"improved risk" criteria described in DOE-ID SD 5480.7. These more stringent requirements apply to an unit or complex of units when one or more of the following conditions exists:

- (a) High dollar (over \$250,000) replacement value
- (b) Unit(s) is used to store or house vital documents, key instrumentation or components with a long lead time
- (c) Loss would have a serious programmatic impact (vital facility)
- (d) A life safety hazard is created.

2.6 The requirements of Section 4.0 shall be used in conjunction with DOE STD1088.

**K-3. GENERAL REQUIREMENTS**

3.1 Utility Requirements All utilities that are connected to applicable relocatable structures shall be designed, constructed and as-built in conformance with the AES

3.2 Electrical Requirements All electrical wiring shall be installed to meet the NEC with particular attention given to the following:

- (a) The service shall be installed in approved conduit.
- (b) Trailer service wiring shall be approved trailer service cable containing neutral and ground.
- (c) UL labeled Class A ground-fault circuit interrupters shall protect outlets on the exterior and indoors in kitchens, bathrooms, and laundry rooms, or in any other location where there is a potential for contact with water.
- (d) All electrical fixtures and boxes shall be physically secure.
- (e) Each unit shall have an individual, external disconnect switch, unless the installed electrical panel has a single main disconnect.
- (f) The requirements of NEC Article 550 shall be met.
- (g) The hot and neutral, hot and ground, and neutral and ground conductors shall be checked to ascertain that they are not reversed prior to occupying the unit.
- (h) Lighting levels should meet the lighting standards specified in OSHA regulations contained in 29 CFR 1910.

3.3 Portable Extinguishers Portable fire extinguishers shall be provided in each unit, with the number, type, and size in accordance with NFPA 10, or as directed by the OC Facility FPE.

3.4 Automatic Detection and Alarms If a unit or complex is protected by an automatic sprinkler system, water flow and control valve supervision alarms are required. The alarms must be connected to the INEEL alarm system or responsible fire department alarm system.

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- (a) Product of combustion detectors with local alarms shall be installed in each unit which is to be used for sleeping. All such units shall be equipped with manual fire alarm pull stations at each exit, and local evacuation alarms installed in accordance with NFPA 72 Style A or B. Without exception, alarm and detection equipment shall be connected to the INEEL alarm system or to the responsible fire department alarm system.
  - (b) For units or complexes that are remotely located or are located outside of a security perimeter fence where it is cost prohibitive to provide hard wired or fiber optic cable for alarm reporting to the INEEL alarm system, fire reporting panels be may be tied into the system via phone modems. This method of alarm reporting, however, is not UL listed and/or FM approved for the fire alarm systems currently installed at DOE-ID facilities. This option may be used only on a case basis with prior approval from the DOE-ID AHJ.
- 3.5 **Sanitation** Refer to the requirements of 29 CFR 1910 and the UBC for sanitation requirements.
- 3.6 **Occupancy** Trailers, and similar portable structures shall be used only for low-hazard occupancies (office space, etc.), in accordance with NFPA 101. Higher hazard occupancy use must have specific approval from the Facility FPE. There shall be no equipment, records or operations of programmatic importance in any unit, unless the requirements of Section 3.0 of this Appendix are met.

#### K-4. SPECIFIC REQUIREMENTS TO MEET IMPROVED RISK CRITERIA

- 4.1 **Wind and Snow Loading** The unit shall be able to withstand a snow load of 30 lb/ft<sup>2</sup> (14.6 g/cm<sup>2</sup>), a horizontal wind load of 20 lb/ft<sup>2</sup> (9.8 g/cm<sup>2</sup>), and a vertical uplift of 19 lb/ft<sup>2</sup> (9.3 g/cm<sup>2</sup>). Tie down protection shall be utilized as required by the OC Facility FPE.
- 4.2 **Construction** Ceilings shall be UL listed gypsum or acoustical tile having a flame spread rating of 25 or less and smoked developed rating of 50 or less. Wallboard and surface material shall be UL listed with flame spread rating under 25 and with fuel and smoke developed rating under 50. Insulation shall be noncombustible batts meeting the UL ratings listed above. Minimum "R" factors for batts shall be 11 for walls and 19 for floors and ceilings.
- 4.3 **Housekeeping** The underside of trailers and portable structures shall be lined with 18 ga. sheet metal or noncombustible material unless otherwise determined by the OC Facility FPE.
- 4.4 **Sprinkler Protection** Automatic sprinkler protection shall be provided in all units where improved risk criteria apply or as specified by the OC Cognizant FPE. Sprinkler systems shall be designed in accordance with NFPA 13 for Ordinary Hazard Group 1 systems, as a minimum. All equipment shall be UL listed and/or FM approved for fire protection systems, with design acceptance by the OC Facility FPE, subject to concurrence by the DOE-ID AHJ.

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ENGINEERING STANDARDS****TITLE: STANDARD FOR TRAILERS, MODULAR  
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- 4.5 Automatic sprinkler protection systems shall be tied into the responsible fire department alarm system such that activation of the system will give an alarm to the INEEL alarm system or responsible fire department alarm system.
- 4.6 Portable or modular units requiring sprinkler systems shall be constructed such that the overhead trusses and beams and column supports for these trusses and beams can also support a fully charged wet pipe sprinkler system including water filled piping and hangers. If these units are existing (new or used) and are intended to be installed at the INEEL, contact the OC Facility FPE for direction. A minimum design density shall be 0.19 over 2500 sq ft and shall include 500 gpm hose allowance.

**Appendix L**

**Reserved For**

**Life Safety Systems Site Specific Requirements**



# **Appendix M**

## **Standard for Piping Materials and Pipe Numbering, Labeling, and Color Coding**

**August 1998**

**APPENDIX M**  
**STANDARD**  
**for**  
**PIPING MATERIALS**  
**and**  
**PIPE NUMBERING, LABELING AND COLOR CODING**

**PREFACE**

This document consists of a Piping Material for each Line Class. The Piping Material Service Code/Line Class/Color Code/Fluid Category Index lists piping system service codes and identifies the Line Class or Classes that are applicable to each service code. New piping systems at INEEL facilities that require a pipe identification system shall use the Index guidelines unless otherwise directed in specific facility or project design criteria. Facilities with other piping identification systems will provide the Design Organization with a labeling scheme to be used on the design documents.

The Piping Material Standards provide a set of standard piping materials and components based upon criteria which has been established for piping systems at ICPP. The standard materials are recommended for new work at other INEEL facilities and are required for new work at SMC. Each service material designated can be referenced to an applicable code. See Sections 1540 through 1543 for the applicable code.

The piping material standards along with the body of the DOE-ID AE Standards and the applicable code provide a basic guideline to specifying piping materials. These standards do not substitute for education, experience and sound engineering judgement. The material standards are to be considered a starting point and in no way relieve the designer from researching original installation specifications on existing facilities and performing all appropriate piping stress analysis on new designs and specifying piping materials accordingly.

Evaluation of a system may require specification of a more appropriate material than those listed in the material standards. At ICPP and SMC lesser material specifications can only be used upon written approval from appropriate facility representatives. For example, at ICPP or SMC, the Design Engineering Organization may approve alternate piping materials.

For new construction at the FAST facility the various FAST piping specifications shall be used for piping design purposes. See ICPP Design Engineering Organization for more information on FAST specifications.

**PIPING MATERIAL**  
**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
AA.	Atmospheric Air	AR	Stainless Steel 304L	Blue/White	D	
AC	Acetylene	AR	Stainless Steel 304L	Yellow/Black	Base	
AH	Ammonium Hydroxide	AR	Stainless Steel 304L	Yellow/Black	Base	(1)
AM	Air-Methane	AR	Stainless Steel 304L	Blue/White	D	(d)
AN	Aluminum Nitrate	AR HA	Stainless Steel 304L Hastelloy G-30 <sup>R</sup>	Yellow/Black	Base	(1)
AR	Argon	AR	Stainless Steel 304L	Blue/White	D	
AS	AMSCO	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	Base	(D)
AW	Analytical Grade Water	NK	Copper Tubing	Green/White	D	
BA	Breathing Air	AM AR NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel	Blue/White	D	
BB	Boiler Blowdown	NN	Carbon Steel	Yellow/Black	ASME B31.1	
BC	Boiler Chemical	NN	Carbon Steel	Yellow/Black	Base	
BF	Boiler Feedwater	NN	Carbon Steel	Yellow/Black	ASME B31.1	
BR	Chilled Brine Coolant	NN	Carbon Steel	Green/White	D	
BW	Basin Water	AR	Stainless Steel 304L	Yellow/Black	D	(e)
CB	Emergency HF Acid Drain			Yellow/Black	M	
CC	Cask Coolant	AR	Stainless Steel 304L	Green/White	D	(e)
CE	Cation Effluent	NF	Carbon Steel Polypropylene Lined	Green/White	D	
CG	Cell Off Gas	AR	Stainless Steel 304L	Yellow/Black	M	(1)(a)
CL	Chlorine	NF	Carbon Steel Polypropylene Lined	Yellow/Black	M	
CN	Calcium Nitrate (Dry and Solution)	AR	Stainless Steel 304L	Yellow/Black	D	
CO	Chromic Oxide	AR	Stainless Steel 304L	Yellow/Black	BASE	
CO2	Carbon Dioxide	AR NJ	Stainless Steel 304L Galv. Carbon Steel	Blue/White	D	(20) (20)
CP	Cadmium Sulfate	AR CA	Stainless Steel 304L Carpenter 20 Cb3 <sup>R</sup>	Yellow/Black	BASE	

**PIPING MATERIAL**  
**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
CR	Chilled Water Return	AR NK NN	Stainless Steel 304L Copper Tubing Carbon Steel	Green/White	D	
CS	Chilled Water Supply	AR NK NN	Stainless Steel Copper Tubing Carbon Steel	Green/White	D	
CT	Condensate	AR HG NN NS  NC NK	Stainless Steel 304L Hastelloy G-30 <sup>R</sup> Carbon Steel Fiberglass Reinf. Plastic (FRP) Carbon Steel - Weld Fittings Copper Tubing	Yellow/Black	D	(1)  (6) (10)
CU	Common Utility	AR	Stainless Steel 304L	Yellow/Black	BASE	
CW	Potable Water (Hot or Cold)	NJ NK NN NR ND NW	Galv. Carbon Steel Copper Tubing Carbon Steel Concrete-Lined Ductile Iron CPVC PVC	Green/White	UPC	(c)  (5) (22)  (4) (3)
CWR	Cooling Water Return	AR NK NN	Stainless Steel 304L Copper Tubing Carbon Steel	Green/White	D	(F)
CWS	Cooling Water Supply	AR NK NN	Stainless Steel 304L Copper Tubing Carbon Steel	Green/White	D	(F)
DA	Drying Air	NN	Carbon Steel	Blue/White	D	
DC	Decontaminant Solution	AB AR BD  HC HG	Nitronic 50 <sup>R</sup> Stainless Steel 304L Stainless Steel 304L 10,000 psi rated Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Hastelloy G-30 <sup>R</sup>	Yellow/Black	BASE OR M	(15) (f) (g) (1)
DE	Diatomaceous Earth	AR NJ	Stainless Steel 304L Galv. Carbon Steel	Green/White	D	
DG	Dissolver Off-Gas	AA AR	Monel 400 <sup>R</sup> Stainless Steel 304L	Yellow/Black	M	(a) (1)
DL	Diesel oil	NN	Carbon Steel	Yellow/Black	BASE	
DN	Denitrator Product	AC AD	Stainless Steel 347 Stainless Steel Sch 40 and Sch 80 304L	Yellow/Black	M	(b)
DO	Dodecane	AR	Stainless Steel 304L	Yellow/Black	BASE	
DP	DOP Aerosol	AR	Stainless Steel 304L	Yellow/Black	M or D	(h)(a)

**PIPING MATERIAL**  
**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
DW	Demineralized Water	AR	Stainless Steel 304L	Green/White	D	(1)
EA	Exhaust Air	AR	Stainless Steel 304L	Blue/White	D	(G)(e)
ED	Ethylene Diamine Tetracetic Acid	AR AD	Stainless Steel 304L Stainless Steel Sch 40 and Sch. 80 304L	Yellow/Black	BASE	
FA	Fluidizing Air	AR NN	Stainless Steel 304L Carbon Steel	Blue/White	D	
FB	Fluoboric Acid	CA HC NB	Carpenter 20 Cb-3 <sup>R</sup> Hastelloy C-4 <sup>R</sup> or C- 22 <sup>R</sup> Carbon Steel ECTFE- Lined	Yellow/Black	M	
FL	Fuel Oil	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	BASE	
FM	Fire Extinguishing Foam	NN	Carbon Steel	Red/White	NFPA	
FP	Filtered Product	AR	Stainless Steel 304L	Yellow/Black	M	(b)
FR	Freon	NM	Copper Tubing (Refrigerant)	Yellow/Black	D	
FW	Fire Water	AR NJ NN NR NA	Stainless Steel 304L Galvanized Carbon Steel Carbon Steel Ductile Iron PVC per AWWA C900	Red/White	NFPA	(21) (14)(21) (5)(14)(21) (14) (19)
GL	Glycol Solution Supply	NN	Carbon Steel	Green/White	D	
GR	Glycol Solution Return	NN	Carbon Steel	Green/White	D	
GS	Gasoline	NJ NN	Galv. Carbon Steel Carbon Steel	Yellow/Black	BASE	
HA	High Pressure Air 100#	AC AM AR NN	Stainless Steel 347 Stainless Steel Tube Stainless Steel 304L Carbon Steel	Blue/White	E	(1)
HB	High Pressure Air 150# (Dry)	AM AR NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel	Blue/White	D	
HE	Helium	AR	Stainless Steel 304L	Blue/White	D	
HF	Hydrofluoric Acid	AA HC NB	Monel 400 <sup>R</sup> Hastelloy C-4 <sup>R</sup> or C- 22 <sup>R</sup> Carbon Steel ECTFE	Yellow/Black	M	

**PIPING MATERIAL**  
**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
		NF NU NV	Lined Carbon Steel Polypropylene Lined Solid PVDF Carbon Steel PVDF Lined			
HG	Halon Gas	AR	Stainless Steel 304L	Red/White	NFPA	
HH	Hydrogen	AR NN	Stainless Steel Carbon Steel	Yellow/Black	BASE	
HI	Instrument Air 100#	AM AR NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel	Blue/White	D	
HS	High Pressure Steam	AM AR NC NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel Weld Fittings Carbon Steel	Yellow/Black	D	(9)(6)(10) (1)
HW	High Level Waste	AR	Stainless Steel 304L	Yellow/Black	M	(a)(1) See ALSO PW
HWR	Hot Water Return	AD AR NN	Stainless Steel Sch. 40 and Sch. 80 304L Stainless Steel 304L Carbon Steel	Green/White	D	
HWS	Hot Water Supply	AD AR NN	Stainless Steel Sch. 40 and Sch. 80 304L Stainless Steel 304L Carbon Steel	Green/White	D	
HX	Hexone	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	BASE	(1)
HY	Hydraulic Fluid	AR NN	Stainless Steel 304L Carbon Steel	Green/White	BASE	(1) (11)
JV	Jet Vent	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	M	(a) (16)
JW	Boric Acid or Borated Water	AR	Stainless Steel 304L	Yellow/Black	D	
KR	Kerosene	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	BASE	
LA2	Low Pressure Air 20#	AM AR NN	Stainless Steel Tubing Stainless Steel 304L Carbon Steel	Blue/White	D	
LA5	Low Pressure Air 50#	AM AR NN	Stainless Steel Tubing Stainless Steel 304L Carbon Steel	Blue/White	D	
LH	Air (Humidified)	AM AR	Stainless Steel Tubing Stainless Steel 304L	Blue/White	D	

**PIPING MATERIAL**  
**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
LI2	Instrument Air 20#	AM AR NN NP NQ	Stainless Steel Tubing Stainless Steel 304L Carbon Steel Copper Tube Aluminum Tube	Blue/White	D	(8) (8)
LI5	Instrument Air 50#	AM AR NN NP NQ	Stainless Steel Tubing Stainless Steel 304L Carbon Steel Copper Tube Aluminum Tube	Blue/White	D	(8) (8)
LM	Limestone	NN	Carbon Steel	Green/White	D	
LN	Liquid Nitrogen	AM AR NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel	Yellow/Black	BASE	
LO	Lube Oil	AR NN	Stainless Steel 304L Carbon Steel	Green/White	BASE	
LS	Low Pressure Steam (50# or less)	AM AR NC  NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel Weld Fittings Carbon Steel	Yellow/Black	D	(9) (1)  (6)(10)
ME	Methane			Yellow/Black	BASE	
MG	Makeup Off-Gas	AB AD AR CA HC NF  NV	Nitronic 50 <sup>R</sup> Stainless Steel 304L Stainless Steel 304L Carpenter 20 Cb-3 <sup>R</sup> Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Carbon Steel Polypropylene-Lined Carbon Steel - PVDF Lined	Yellow/Black	D	
MN	Mercuric Nitrate	AR	Stainless Steel 304L	Yellow/Black	BASE	(1)
NA	Nitric Acid	AR	Stainless Steel 304L	Yellow/Black	BASE OR M	(1)(f)
NB	Ammonium Nitrate	AR	Stainless Steel 304L	Yellow/Black	BASE	
NC	Noncondensibles (from Evaporator)	AD  NC	Stainless Steel Sch. 40 and Sch. 80 304L Carbon Steel, Weld Fittings	Yellow/Black	D	
NG	Inert Gas	AR AA	Stainless Steel 304L Monel 400 <sup>R</sup>	Blue/White	D	(A)
NH	Nitrogen Gas (Humidified)	AM AR NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel	Blue/White	D	

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**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
NM	Ammonium Nitrate	AR	Stainless Steel 304L	Yellow/Black	D	(C)
NO	Nitrous Oxide (N <sub>2</sub> O)	AR	Stainless Steel 304L	Yellow/Black	D	
NPH	Normal Paraffin Hydrocarbon	AR	Stainless Steel 304L	Yellow/Black	BASE	
NR	Nitrogen Gas (Dry)	AM AR NN	Stainless Steel Tube Stainless Steel 304L Carbon Steel	Blue/White	D	(1)
NW	Nuclear Poisoned Water	AR	Stainless Steel 304L	Yellow/Black	D	
ON	Oxygen	AR	Stainless Steel 304L	Yellow/Black	D	
OW	Organic Waste	AD	Stainless Steel 304L	Yellow/Black	M	(a)
PA	Process Ash	AR NU NV	Stainless Steel 304L Solid PVDF Carbon Steel, PVDF Lined	Yellow/Black	M	(a)
PB	Process Bed Material	AR NU NV	Stainless Steel 304L Solid PVDF Carbon Steel PVDF Lined	Yellow/Black	M	(a)
PC	Process Solution Complexed w/HF Exposure	AB AR HC	Nitronic 50 <sup>R</sup> Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup>	Yellow/Black	M	(a)
PE	Process Equipment Waste	AR HC	Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup>	Yellow/Black	M	(1)(a)(i)
PEF	Process Equipment Waste w/HF Exposure	AR HC	Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup>	Yellow/Black	M	(a)(i)(H)
PF	Process - Fluoride			Yellow/Black	M	(a)
PL	Process Waste Low Level w/HF Exposure	AR HC HG NL	Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Hastelloy G-30 <sup>R</sup> Polypropylene	Yellow/Black	M	(1)(a)
POG	Process Off-Gas			Yellow/Black	M	(a) (l)
PP	Propane	NN	Carbon Steel	Yellow/Black	BASE	
PR	Process Heating/ Cooling	AR	Stainless Steel 304L	Green/White	D	
PS	Process Solution (Uncomplexed)	AA AB AR HC NU	Monel 400 <sup>R</sup> Nitronic 50 <sup>R</sup> Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup>	Yellow/Black	M	(a)  (1)



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SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
		NV	Solid PVDF Carbon Steel PVDF Lined			
PSF	Process Waste to Calcination Process			Yellow/Black	M	(a)
PSG	Process System Off-Gas			Yellow/Black	M	(E)(a)
PSL	Process Liquid Sample	AD AR HC HG	Stainless Steel Sch. 40 and Sch. 80 304L Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Hastelloy G-30 <sup>R</sup>	Yellow/Black	M	(a)
PSS	Process Scrub Solution	AR	Stainless Steel 304L	Yellow/Black	M	(a)
PU	Purge	AR	Stainless Steel 304L	Blue/White	D	
PW	Process Waste High Level	AB AR	Nitronic 50 <sup>R</sup> Stainless Steel 304L	Yellow/Black	M	(a)
PWL	Process Waste Low Level	AR	Stainless Steel 304L	Yellow/Black	M	(a)
RC	Recycle Water (Process)	AR	Stainless Steel 304L	Yellow/Black	M	(a)
RD	Refrigerant Hot Gas	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	D	
RE	Analytical Reagent Chemical	AR	Stainless Steel 304L	Yellow/Black	M	
RG	Rare Gas	AR	Stainless Steel 304L	Yellow/Black	BASE OR M	(a)(e)
RL	Refrigerant Liquid	AR NM NN	Stainless Steel 304L Copper Tube (Refrigerant) Carbon Steel	Yellow/Black	D	
RS	Refrigerant Suction	AR NM NN	Stainless Steel 304L Copper Tube (Refrigerant) Carbon Steel	Yellow/Black	D	
RW	Raw Water	AR NN NR	Stainless Steel 304L Carbon Steel Ductile Iron	Green/White	D	(14) (5)(14) (14)
SA	Sulfuric Acid	CA NF	Carpenter 20 Cb3 <sup>R</sup> Carbon Steel Polypropylene Lined	Yellow/Black	BASE	
SC	Sodium Carbonate	AR	Stainless Steel 304L	Green/White	D	
SFA	Sulfamic Acid	AD	Stainless Steel Sch. 40	Yellow/Black	BASE	

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SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
		AR	and Sch. 80 304L Stainless Steel 304L			
SG	Sampler Off-Gas	AR HC HG	Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Hastelloy G-30 <sup>R</sup>	Yellow/Black	M	(1)(a)
SGC	CAM Vacuum System	AM AR	Stainless Steel Tube Stainless Steel 304L	Yellow/Black	D	
SH	Sodium Hydroxide	AR NN	Stainless Steel 304L Carbon Steel	Yellow/Black	BASE	
SP	Span Gas (for Calibration)	AR	Stainless Steel 304L	Yellow/Black	See notes	(j)
SS	Sample Station Utilities	AM AR	Stainless Steel Tube Stainless Steel 304L	Yellow/Black	BASE	
ST	Starting Air	NN	Carbon Steel	Blue/White	D	
SV	Sanitary Vent	NJ NO NT NY	Galv. Steel PVC - DWV Cast Iron ABS	Blue/White	UPC	(7)(c) (11)(12)(13) (11)(12)(13)
SW	Service Waste	AM NF NH NN NS	Stainless Steel Tube Carbon Steel Polypropylene Lined Polyethylene Carbon Steel FRP	Green/White	D	(e)
TA	Transport Air	AB AR	Nitronic 50 <sup>R</sup> Stainless Steel 304L	Blue/White	D	(18)(e) (17)
TP	Tributyl Phosphate	AR	Stainless Steel 304L	Yellow/Black	BASE	
TR	Tartaric Acid	NJ	Galv. Carbon Steel	Green/White	D	
TW	Treated Water	AM NJ NN	Stainless Steel Tube Galv. Carbon Steel Carbon Steel	Green/White	D	(1)
UV	Utility Vent	AR NN	Stainless Steel 304L Carbon Steel	Blue/White	D	(e)
VA	Vacuum Air	AR NN	Stainless Steel 304L Carbon Steel	Blue/White	D	(G)
VG	Vessel Off Gas	AC AR HC HG NB	Stainless Steel 347 Stainless Steel 304L Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Hastelloy G-30 <sup>R</sup> Carbon Steel ECTFE-Lined	Yellow/Black	M	(a)(i)
WQ	Sanitary Waste	NE	Vitrified Clay	Yellow/Black	UPC	(c)

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**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

SERVICE CODE	SERVICE	LINE CLASS	MATERIAL	COLORS BACKGROUND LETTER	ASME B31 FLUID CATEGORY	NOTES
		NH NO NT NY NI	Polyethylene PVC-DWV Cast Iron ABS Concrete			
WR	Cooling Water Return			Green/White	D	(B)(F)
WS	Wash Solution	AR NU NV	Stainless Steel 304L Solid PVDF Carbon Steel PVDF Lined	Green/White	D	(F)
XW	Chemical Waste	AR ND NF NS	Stainless Steel CPVC Carbon Steel Polypropylene Lined FRP	Yellow/Black	M	(1)(i)

**PIPING MATERIAL  
SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

**GENERAL NOTES:**

- (I) In cases of cross connects, such as utility lines to process lines, where the less severe service piping can be contaminated by backfilling from the more severe service, the line class shall follow that of the more severe service back to and including the first normally closed valve on the less severe service line.
- (II) Where a line class has not been specified for a specific service code, contact the Facility Design Engineering Organization for recommendations.
- (III) For higher pressures the designer has the option of using heavier schedule pipe.
- (IV) For corrosion allowance information on piping contact ICPP Materials Development and Technology Group.
- (V) This is not a closed listing. New codes will be devised and this Appendix will be updated when needed.

**SERVICE CODE/COLOR CODE NOTES:**

- (A) This service code shall not be used in the future. Use AR for Argon or NR for Nitrogen.
- (B) This service code has been replaced by CWR.
- (C) NB shall be the preferred service code for ammonium nitrate in the future.
- (D) AS is the accepted service code for AMSCO. AS was also used as a code for ash in Rover, however, this code shall not be used in the future for ash.
- (E) POG shall be the preferred service code for process off-gas in the future.
- (F) Color code dependent on chemical additives - contact Industrial Safety for guidance.
- (G) Color code dependent on contamination levels - contact Health Physics for guidance.
- (H) PE was used at FDP for Process Equipment Waste w/ HF Exposure in the original installation, however, to be consistent with the rest of the plant where PE refers to Process Equipment Waste (without HF exposure) all future PEW lines w/ HF exposure shall be coded PEF.

**LINE CLASS NOTES:**

- (1) Original Plant - Type 347, Since 1956 - Type 304L
- (2) AR shall be used on all new installation in NWCF instead of existing NWCF spec. classes AD and AF, however, the designer is cautioned to research the original NWCF spec. and upgrade the requirements of line class AR if required for the particular service. See also the preface to this appendix and notes under line class AR for direction to the designer for upgrading for the intended service.

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- (3) Cold water outside buildings only.
- (4) Hot (180°F max.) and cold water inside and outside buildings.
- (5) For underground utility piping it is suggested that C.S. pipe and welded fittings be used to ensure electrical continuity. Buried pipe to be coated and protected per Cathodic Protection Section of this Standard. All buried utility lines under concrete slabs shall be all welded construction.
- (6) All underground steam and condensate piping shall be C.S. with welded fittings. Buried pipe to be protected per Cathodic Protection Section of this Standard.
- (7) Galvanized steel pipe shall not be used for sanitary vents underground and shall be kept at least 6" above the ground.
- (8) Where tubing and fittings are used in applications having direct or indirect communication with either radioactive or corrosive chemical, they shall be fabricated of austenitic stainless steel as a minimum or a suitable corrosion resistant material.
- (9) Steam tracing only.
- (10) Carbon steel pipelines that carry steam or condensate and are buried or located in inaccessible areas shall be of Schedule 80 wall thickness and heavy wall fittings shall be used.
- (11) 4" pipe size and less.
- (12) Limited to structures where combustible construction is allowed.
- (13) Not for use under buildings.
- (14) For buried fire water lines and buried raw water lines supplying fire water mains, mechanical joints shall be used except under concrete slabs. Raw water lines which supply fire water mains shall be designed using the same design criteria as for fire water lines. See individual line class specification sheets for more detail. Note that mechanical joints must be bonded to pipe for electrical continuity per this standard.
- (15) For FPR high pressure decon jumpers only.
- (16) Some portions of the jet vent header systems have used carbon steel piping in the past. All future installations on jet vent header systems shall use only austenitic stainless steel piping.
- (17) In-cell solids-free.
- (18) Containing solids.
- (19) For use in underground pressurized fire water lines only.

**PIPING MATERIAL**  
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- (20) NJ and AR line classes shall be used in general, however, the designer shall modify these line classes for this service code per the requirements of Kidde-Fenwal CO2 Fire Protection System Manual "Standard Specification for Pipe and Fittings Conveying High Pressure Carbon Dioxide". For line class NJ use the specification for "Steel Pipe and Fittings". For line class AR use the equivalent pipe and fitting pressure ratings as found in the specification for "Steel Pipe and Fittings".
- (21) For use in aboveground pressurized fire water lines only.
- (22) For all new and replacement metallic piping use Class NJ or NK. Class NN shall not be used for any future work.

**FLUID CATEGORIZATION NOTES:**

- (a) Dependent on location. In limited access areas such as process cells this service can be considered base category and takes precedence over notes (b), (e), (f) and (h).
- (b) Although this service does not fit the definition of category M in ASME B31.3 it shall be considered category M for ICPP application due to the fissionable material hazard.
- (c) UPC is the Uniform Plumbing Code.
- (d) Equal to or less than 10% methane for RAL x-ray spectrometer.
- (e) GENERAL CATEGORIZATION NOTE: Services with a normal radiological contamination level above  $3.6 \times 10^{-6}$   $\mu\text{c/ml}$  solution shall be considered category M.
- (f) Hot nitric acid (above 100EF) shall be considered category M.
- (g) May contain a variety of fluids. When the service contains hot nitric acid see note (f).
- (h) Category M on contaminated side of valve. DOP aerosol supply on uncontaminated side of valve is category D.
- (i) Some services may have very low contamination and/or chemical concentration levels and could therefore be considered a lower category than indicated. Contact design engineering organization for these cases.
- (j) Dependent on particular service being sampled. See fluid category for service being sampled.
- (k) GENERAL CATEGORIZATION NOTE: Services in this listing which are within the confines of power/steam generating facilities shall be ASME B31.1.
- (m) Service code POG can be considered category D fluid service if threshold contamination limit described in note (e) above is not exceeded.

**PIPING MATERIAL**  
**SERVICE CODE / PIPING LINE CLASS / COLOR CODING / FLUID CATEGORY INDEX**

The following is a list of the line classes used in the index. For a complete description of the piping specifications, see individual piping material specification sheets.

<u>Line Class</u>	<u>Material</u>
<u>Code</u>	
AA	Monel 400 <sup>R</sup>
AB	Nitronic 50 <sup>R</sup> (11)
AC	347 SST
AD	304L SST Piping Sch 40 and Sch 80 (1)
AE	Inactive (3)
AF	Inactive (2)
AJ	Inactive (4)
AM	304 SST Tubing
AR	304L SST Pipe Sch 40
BD	304L SST Pipe - 10,000 PSI Rated (8)
CA	Carpenter 20 Cb-3 SST <sup>R</sup> (11)
HC	Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> (10) (11)
HG	Hastelloy G-30 <sup>R</sup> (10) (11)
NA	PVC per AWWA C900
NB	Carbon Steel ECTFE-Lined (Halar <sup>R</sup> )
NC	Carbon Steel w/SW or BW Fittings
ND	CPVC (6)
NE	Vitrified Clay (7) (11)
NF	Carbon Steel Polypropylene - Lined
NG	Inactive (5)
NH	Polyethylene (11)
NI	Concrete (11)
NJ	Galvanized Carbon Steel
NK	Copper Tubing - Type L or K
NL	Polypropylene (11)
NM	Copper Tubing (Refrigerant Service)
NN	Carbon Steel w/SCRD, SW, BW or Flanged Fittings
NO	PVC-DWV (11)
NP	Copper Tubing - Type K
NQ	Aluminum Tubing
NR	Ductile Iron, Concrete - Lined (11)
NS	Fiberglass Reinforced Plastic (FRP) (11)
NT	Cast Iron (11)
NU	Solid PVDF (Kynar <sup>R</sup> ) (11)
NV	Carbon Steel, PVDF - Lined (Kynar <sup>R</sup> )
NW	PVC
NX	Transite (Prohibited in all new installations) (11)
NY	ABS Plastic Drain, Waste, and Vent (11)
NZ	Inactive (9)

**NOTES:**

1. AD was also a line class used on original construction at NWCF. It included both Sch 40 and Sch

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80 304L SST pipe. See NWCF Spec. SP-453504-50-3 for reference. It was incorporated into line classes AD and AR. In general where Sch 80 pipe was used in a line class use line class AD. Use line class AR for Sch 40. At FPR class AD is used for in-cell piping and class AR for out-of-cell piping. Class AD provides for Sch 80 pipe in the 1/2" to 2" pipe sizes to attain corrosion allowances for the 40 year design life of the facility.

2. AF was a line class used on original construction at NWCF. It included both Sch 40 and Sch 80 304L SST pipe. See NWCF Spec. SP-453504-50-3 for reference. It was incorporated into line classes AD and AR. In general where Sch 80 pipe is used in a line use line class AD. Use line class AR for Sch 40.
3. AE was a line class used on original construction at NWCF. It included Sch 10, 40 and Sch 80 304L SST pipe for oxygen service. See NWCF Spec. SP-453504-50-3 for reference. It was incorporated into line classes AD and AR.
4. AJ was an Inconel<sup>R</sup> line class. Inconel pipe is no longer used at ICPP.
5. NG was an aluminum line class. Aluminum pipe is no longer used at ICPP.
6. Line class ND, CPVC, shall be used for hot water services in systems where line class NW, PVC, is used for potable water.
7. NE is the designated line class for vitrified clay. NE was used at NWCF for cast iron, however, NT is the designated line class for cast iron. All future work at NWCF shall use NT for cast iron.
8. BD is a line class used at FPR only for jumpers at the cell wall for high pressure decon. This line class is not anticipated to be used elsewhere in the future. No piping specification is provided here as this line class is inactive for future work. See FPR Spec. Package CP-5B Div. 15 Subdivision 15.18 for more details.
9. NZ was a line class designation for concrete pipe. NI is the preferred line class designation for concrete pipe.
10. HG has been used as a line class designation for Hastelloy C-4<sup>R</sup> / C-22<sup>R</sup> in CPP-601 E-Cell and at FDP. All new installations shall use HC line class designation for Hastelloy C-4<sup>R</sup>/C-22<sup>R</sup>.
11. These materials as well as Nitronic 60<sup>R</sup> used for bolting materials are not listed in ASME/ANSI B 31.3 for the service intended, however, they are approved for service based on prior experience and additional testing per paragraph 304.7.2. In addition, some of these may be Water Supply and Sewage piping and are listed in the Uniform Plumbing Code.



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The following are trademarks used throughout the material specification sheets:

Blue Brute - J.M. Manufacturing Co., Inc.  
Carpenter 20 Cb3 - Carpenter Technology Corp.  
DOW Plastic - Lined Valves, Fittings and Pipe - DOW Chemical Company  
Driscopipe - Philips Driscopipe, Inc.  
Fluoroflex-K - Resistoflex Corp.  
Grafoil - Union Carbide  
Gylon - Garlock, Inc.  
Halar - Allied Chemical Co., Inc.  
Hastelloy C-4 - Haynes International, Inc.  
Hastelloy C-22 - Haynes International, Inc.  
Hastelloy G-30 - Haynes International, Inc.  
Hypalon - E.I. DuPont De Nemours and Co.  
Inconel - Huntington Alloys Inc.  
Kynar - Pennwalt Corp.  
Monel 400 - Huntington Alloys, Inc.  
Nitronic 50 - Armco, Inc.  
Nitronic 60 - Armco, Inc.  
Nupro - Crawford Fitting Company  
R-Con Pipe Connector - R-Con International, Inc.  
Superproline - Asahi/America Inc.  
Swagelok - Crawford Fitting Company  
Tefzel - E.I. DuPont De Nemours and Co.  
Triple-Lok - Parker-Hannifin Corp.  
Viton - E.I. DuPont De Nemours and Co.  
Whitey - Crawford Fitting Company

## PIPING MATERIAL STANDARDS

### Monel 400<sup>R</sup>, 150 psi Service Rating, Line Class AA

#### Design Notes

1. All external components for valves shall be 304, 316, or approved equal Stainless Steel.
2. Where corrosion or erosion will be excessive or higher pressures or other pipe stresses are encountered, the designer has the option of selecting heavier walled pipe and higher rated valves and fittings.
3. When using spiral wound gaskets, see Rules for Bolted Flange Connections, ASME Section VIII Div.1 Appendix 2 or ASME Section VIII Div.2 Appendix 3 and ASME Section III Div. 1, Subsection ND, Section ND-3658 (for equivalent pressure approach) to ensure that the gaskets are applicable for the particular service intended. In cases where spiral wound gaskets are incompatible with the above requirements contact ICPP Design Engineering Organization for further guidance.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" & Smaller	Seamless Monel 400 <sup>R</sup> , Sch 80S, Annealed.	ASTM B165 UNS NO4400
	2-1/2" - 8"	Seamless or welded Monel 400 <sup>R</sup> , Sch 40S, Annealed.	ASTM B165 UNS NO4400
Fittings	2" & Smaller	Seamless Monel 400 <sup>R</sup> , Sch 80S Butt-Weld Ends, Annealed.	ASTM B366 WPNCs UNS NO4400 Dimensions per ANSI B16.9
	2-1/2" - 8"	Seamless Monel 400 <sup>R</sup> , Sch 40S Butt-Weld Ends, Annealed.	ASTM B3166 WPNCs UNS NO4400 Dimensions per ANSI B16.9
Branches		Use full or reducing tees or saddles.	
Bolting		Use 304 SST bolts ASTM A193 Gr B8 and galling resistant Nitronic 60 <sup>R</sup> nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Gr. B8 ASTM A194 Gr. 8S UNS S21800
Flanges	2" & Smaller	150# ANSI B16.5, R.F., Weld Neck, Sch 80S, Monel 400 <sup>R</sup> , ASTM B127 UNS NO4400, Finished per ASTM A182.	ASTM B127 UNS NO4400 Dimensions per ANSI B16.5 Finish per ASTM A182
	2-1/2" - 8"	150# ANSI B16.5, R.F., Weld Neck, Sch 40S, Monel 400 <sup>R</sup> , ASTM B127 UNS NO4400, Finished per ASTM A182.	ASTM B127 UNS NO4400 Dimensions per ANSI B16.5 Finish per ASTM A182
Gaskets	All Sizes	Spiral Wound Metallic Type, Monel 400 <sup>R</sup> Spiral Windings, Monel 400 <sup>R</sup> Centering Guide.	API 601 Note 3
	All Sizes	Select for service	

## PIPING MATERIAL STANDARDS

### Stainless Steel Nitronic 50<sup>R</sup>, 150 psi Service Rating, Line Class AB

#### Design Notes

1. All external components for valves shall be 304, 316, or approved equal Stainless Steel.
2. Where corrosion or erosion will be excessive or higher pressures or other pipe stresses are encountered, the designer has the option of selecting heavier walled pipe and higher rated valves and fittings.
3. When using spiral wound gaskets, see Rules for Bolted Flange Connections, ASME Section VIII Div.1 Appendix 2 or ASME Section VIII Div. 2 Appendix 3 and ASME Section III Div.1, Subsection ND, Section ND-3658 (for equivalent pressure approach) to ensure that the gaskets are applicable for the particular service intended. In cases where spiral wound gaskets are incompatible with the above requirements contact ICPP Design Engineering Organization for further guidance.
4. Full port valves are preferred in fouling service.
5. Nitronic 50<sup>R</sup> preferred, 316L only when Nitronic 50<sup>R</sup> not available.
6. Alternate disc materials which are suitable for the intended service may be substituted to minimize galling between the seat and disc with prior approval of ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" & Smaller	Seamless Nitronic 50 <sup>R</sup> Stainless Steel, Sch. 80, Beveled Ends	ASTM-A312 Grade TP XM-19
	2-1/2" and Larger	Seamless or welded Nitronic 50 <sup>R</sup> Stainless Steel, Sch. 40.	Same as above
	5" & Larger	Nitronic 50 <sup>R</sup> Stainless Steel, Sch 40, Centrifugally Cast	ASTM-A-351 Grade CG6MMN
Fittings		Seamless Wrought Stainless Steel, Butt Welding Ends. Note: 90E and 45E Ells to be used only where space prohibits the use of bends. Wall thickness shall match pipe.	ASTM A403 Class WP-S Grade XM-19 ANSI B16.9
Gate Valves	2" and Smaller	150# Class BW or SW Ends, OS&Y, Bolted Bonnet, Integral Seat, Body, Bonnet and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST, Casting ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316L. Select packing and gaskets for service.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 Notes 1 and 6
	1/2" and Larger	150# Class, 1/2" and RF, OS&Y, Bolted Bonnet, Integral Seat, Body Bonnet, and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST, Casting ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316. Select packing and gaskets for service.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 Notes 1 & 6
Globe Valves	1/2" to 2"	150# Class, BW Ends, RF, OS&Y, Bolted Bonnet, Integral Seat Body, Bonnet, and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316L Stainless Steel, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L. Select packing and gaskets for service.	ASTM A351, Grade CG6MMN (5) ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 Notes 1 & 6

## PIPING MATERIAL STANDARDS

### Stainless Steel Nitronic 50<sup>R</sup>, 150 psi Service Rating, Line Class AB

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
	1/2" and Larger	150# Class, RF OS&Y, Bolted Bonnet, Integral Seat Body, Bonnet, and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST Castings ASTM A351 Grade CF8M Forgings ASTM A182, Grade F316. Select packing and gaskets for service.	ASTM A351, Grade CG6MMN (5) ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 Notes 1 & 6
	1/2" and Larger	150# Class, BW ends, SST Bellows-Seal Type, OS&Y, Bolted Bonnet, Integral Seat, Body, Bonnet and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316L Stainless Steel. Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, 3" Long Minimum Pipe Stub Each End.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 Notes 1 & 6
Check Valves	1/2" - 2"	160# Class, BW Ends, Swing Type, Bolted Bonnet, Integral Seat, Body Bonnet and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CF3M. Forgings ASTM A182, Grade F316L.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 Notes 1 & 6
	1/2" and Larger	150# Class, RF, Swing Type, Bolted Bonnet, Integral Seat, Body, Bonnet and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST, Castings ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 Notes 1 & 6
Ball Valves	1/2" - 2"	150# Class, BW Ends, 3-Piece, Solid Body or Split-Body, Top Entry, Body Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316L Stainless Steel, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, Nitronic 50 <sup>R</sup> , or 316 SST Ball and Stem. Seats to be determined for particular service	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF3M ASTM A182 Grade F316L See Notes 1 & 4 ANSI B16.34
	1/2" and Larger	150# Class, RF, Body, Ball and Stem Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST, Castings ASTM A351, Grade CF8M Forgings ASTM A182 Grade F316. Seats to be determined for particular service.	ASTM A351 Grade ASTM A351 Grade CF8M ASTM A182 Grade F316 See notes 1 & 4 ANSI B16.34
Butter-fly Valves	2" and Larger	150# Class, RF or Wafer Type, Body and Disc Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST, Castings Grade CF8M, Forgings ASTM A182, Grade F316, 17-4 PH Stem, Lever-Lock Handle, Seal Rings to be determined for Particular service.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 Note 1
Plug Valves	1/2" - 2"	150# Class, BW Ends, Body, Cover, and Plug Nitronic 50 <sup>R</sup> , Casting ASTM A351, Grade CG6MMN or 316 SST, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, Sleeve Material to be determined for particular service.	ASTM A351 Grade CG6MMN (5) ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 Note 1
	1/2" and Larger	150# Class, RF, Body, Cover and Plug Nitronic 50 <sup>R</sup> , Castings ASTM A351, Grade CG6MMN or 316 SST, Castings ASTM A351, Grade CF8M, Forgings, ASTM A182, Grade F316, Sleeve Material to be determined for particular service.	ASTM A351, Grade CG6MMN (5) ASTM A351 Grade CF8M, ASTM A182 Grade F316 ANSI B16.34 Note 1
Flanges	All Sizes	150# ANSI B16.5, RF, Weld-neck, Nitronic 50 <sup>R</sup> Stainless Steel	ASTM A351 Grade CG6MMN ASTM A182 Grade FXM-19 ANSI B16.5 Note 3

## PIPING MATERIAL STANDARDS

### Stainless Steel Nitronic 50<sup>R</sup>, 150 psi Service Rating, Line Class AB

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Orifice Flanges		300# ANSI B16.5, Raised Face Weld-Neck Type, Nitronic 50 <sup>R</sup> Stainless Steel with 1/2" Socket Weld Taps, Schedule 40S Bore.	ASTM A351 Grade CG6MMN ASTM A182 Grade FXM-19 ANSI B16.36
Gaskets	All Sizes	Spiral Wound Metallic Type, 304L SST Spiral Windings, 304 SST Centering Guide.	API-601 Note 3
	All Sizes	Select for service	ANSI B16.21
Bolting		Use 304 SST Bolts, ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts, ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Gr B8 ASTM A194 Gr 8S UNS S21800
Line Reduction		Eccentric reducers shall be used where entrapment of contaminated substances can occur	
Branches	<u>Run Size</u> 2" and smaller	<u>Branch Size</u> Full size or reducing	<u>Use</u> Tee
	Larger than 2"	2" and smaller Larger than 2"	Saddle Stub-in (a)
		9a) When reinforcement is required, use tees or socket weld or butt-weld saddles in lieu of stub-in.	
		ANSI B.31.3 Fig. 327.4.6D	

## PIPING MATERIAL STANDARDS

### 347 Stainless Steel, 300 psi Service Rating, Line Class AC

#### Design Notes

1. This specification shall be used in lieu of AD and AR for high temperature service. Temperature limit 1000°F.
2. All external components for valves shall be 304, 316, or approved equal SST.
3. Where corrosion will be excessive or higher pressures or other pipe stresses are encountered, the designer has the option of selecting heavier walled pipe and higher rated valves and fittings.
4. When using spiral wound gaskets, see Rules for Bolted Flange Connections, ASME Section VIII Div.1 Appendix 2 or ASME Section VIII Div. 2 Appendix 3 and ASME Section III Div.1, Subsection ND, Section ND-3658 (for equivalent pressure approach) to ensure that the gaskets are applicable for the particular service intended. In cases where spiral wound gaskets are incompatible with the above requirements contact ICPP Design Engineering Organization for further guidance.
5. Full port valves are preferred in fouling services.
6. Alternate disc materials which are suitable for the intended service may be substituted to minimize galling between the seat and disc with prior approval of ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" and Smaller	Seamless Stainless Steel, ASTM A312, Grade TP347 Schedule 80S, Beveled Ends.	ASTM A312 Grade TP347
	2-1/2" and Larger	Seamless Stainless Steel, ASTM A312, Grade TP347, Schedule 40S, Beveled Ends.	ASTM A312 Grade TP347
Fittings	2" and smaller	Seamless Wrought Stainless Steel, BW Ends, ASTM A403, Class WP-S Grade 347, Schedule 80S, Beveled Ends or Forged Stainless Steel, SW Ends, 6000#, ASTM A182 Grade F 347.	ASTM A403 Class WP-S Grade 347 ASTM A182 Grade F 347 Dimensions Per ANSI B16.9 or B16.11
	2-1/2" and Larger	Seamless Wrought Stainless Steel, BWE, ASTM A403 Class WP-S Grade 347, Schedule 40S Beveled Ends.	ASTM A403 Class WP-S Grade 347 Dimensions per ANSI B16.9
Gate Valves	2" and Smaller	300# class BW or SW Ends, OS&Y, Bolted Bonnet, Integral Seat, Body, Bonnet and Disc 347 SST, Casting ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Packing Grafoil <sup>®</sup> , Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
	2-1/2" and Larger	300# Class, Same as above except BW Ends.	Same as above
	1/2" and Larger	300# Class, RF, OS&Y, Bolted Bonnet, Integral Seat, Body, Bonnet and Disc 347 SST, Casting ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347 Packing Grafoil <sup>®</sup> , Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
Globe Valves	2" and Smaller	300# Class, BW or SW Ends, OS&Y, Bolted Bonnet, Body, Bonnet and Disc 347 Stainless Steel, Integral Seat, Castings ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Grafoil <sup>®</sup> Packing, Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
	2-1/2" and Larger	Same as above except for BWE.	Same as above

## PIPING MATERIAL STANDARDS

### 347 Stainless Steel, 300 psi Service Rating, Line Class AC

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
	1/2" and Larger	300# Class, RF, OS&Y, Bolted Bonnet, Body, Bonnet and Disc 347 SST, Integral Seat, Castings ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Grafoil <sup>®</sup> Packing, Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
	1/2" and Larger Bellows-Seal	300# Class, BW Ends, SST Bellows Seal Type, OS&Y, Bolted Bonnet, Integral Seat, Body and Bonnet 347 Stainless Steel, Castings ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Disc 316 Stainless Steel, Packing Grafoil <sup>®</sup> , Bonnet Gasket Grafoil <sup>®</sup> , 3" Long Minimum Pipe Stub each end.	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
Check Valves	1/2" - 2"	300# Class, BW or SW Ends, Swing Type, Bolted Bonnet, Body, Bonnet and Disc 347 Stainless Steel, Integral Seat, Castings ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
	2" and Larger	Same as above except for BWE.	Same as above
	1/2" and Larger	300# Class, RF, Swing Type, Bolted Bonnet, Body, Bonnet and Disc 347 SST, Integral Seat, Castings ASTM A351, Grade CF8C, Forgings ASTM A182 Grade F347, Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34 Note 2 & 6
Ball Valves	1/2" - 2"	300# Class, BW or SW Ends, 3 Piece, Split-Body or Top Entry, Body, Ball and Stem 347 Stainless Steel Castings ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Seal and Gasket Grafoil <sup>®</sup> , seats to be determined for particular service.	ASTM A351 Grade CF8C ASTM A182 Grade F347 See Note 5 ANSI B16.34
	2" and Larger	Same as above except BWE.	Same as above
	1/2" and Larger	300# Class, RF, Body, Ball and Stem 347 SST, Castings ASTM A351, Grade CF8C, Forgings ASTM A182 Grade F347, Seal and Gasket Grafoil <sup>®</sup> , Seats to be determined for particular service.	ASTM A351 Grade CF8C ASTM A182 Grade F347 See Note 5 ANSI B16.34
Plug Valves	1/2" - 2"	300# Class, BW or SW Ends, Body, Cover, and Plug 347 SST, Castings ASTM A351, Grade F8C, Forgings ASTM A182, Grade F347, Sleeve material to be determined for particular service.	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34
	2" and Larger	Same as above except BWE.	Same as above
	1/2" and Larger	300# Class, RF, Body, Cover and Plug 347 SST, Castings ASTM A351, Grade CF8C, Forgings ASTM A182, Grade F347, Sleeve material to be determined for particular service.	ASTM A351 Grade CF8C ASTM A182 Grade F347 ANSI B16.34
Flanges	All Sizes	300# ANSI B16.5, RF, Slip-on, Weld-neck, or Lap Joint and Stub-end, Forged 347 SST.	ASTM A182 Grade F347 ANSI B16.5
Orifice Flanges	All Sizes	300# ANSI B16.5, Raised Face Weld-neck Type, Forged 347 Stainless Steel with 1/2" Socket Weld Taps, Schedule	ASTM A182 Grade F347 Dimensions Per ANSI B16.36

## PIPING MATERIAL STANDARDS

### 347 Stainless Steel, 300 psi Service Rating, Line Class AC

TYPE	PIPE SIZE	MATERIAL DESCRIPTION		CODE
		40S Bore.		
Gaskets	All Sizes	Spiral Wound Metallic Type, 304L SST Spiral Windings with Grafoil <sup>R</sup> Filler, 304 SST Centering Guide.		API-601 Note 4
	All Sizes	Grafoil <sup>R</sup>		ANSI B16.21
Bolting		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800).		ASTM A193 Gr B8 ASTM A194 Gr 8S UNS S21800
Line Reduction		Eccentric Reducers shall be used where entrapment of contaminated substances can occur.		
	<u>Run Size</u>	<u>Branch Size</u>	<u>Use</u>	
Branches	2" and smaller	Full size or reducing Full Size	Tee Tee	
	Larger than 2"	2" and smaller Larger than 2"	Saddle Stub-in (a)	
		(a) When reinforcement is required, use tees or socket weld or butt-weld saddles in lieu of stub-in.		ANSI B.31.3 Fig. 3327.4.6D



## PIPING MATERIAL STANDARDS

### Stainless Steel - 304L, 150 - 300 psi Service Rating, Line Class AD

#### Design Notes

1. This specification shall be used instead of Line Class AR when increased corrosion allowance is required.
2. This line class shall be used in lieu of all or portions of the following line classes. See the Piping Material Specification Index and the specific project specification for more details.
  - o NWCF Spec. SP-453504-50-3 line classes AD, AE and AF.
3. For oxygen service all valves shall be prepared, packaged and tagged "For Oxygen Service".
4. For oxygen service all piping shall be carefully cleaned to be completely free of oil, grease, dirt, or other readily oxidizable foreign material.
5. NPT Fittings shall be used in cell only for instruments and equipment (such as pressure gages, pumps, etc) where welded ends are not available. Out-of-Cell NPT fittings may be used when upstream of the cell wall block valve with prior written approval of ICPP Design Engineering Organization.
6. Three hole flanges, fabricated in accordance with Dwg. 1550-CPP-666-P-600, shall be used where remote removal of equipment or components is required.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" & Smaller	Seamless 304L SST, Sch 80S, Beveled Ends.	ASTM A312 Grade TP304L
	3" and Larger	304L SST, Sch 40S, Beveled Ends.	ASTM A814 Grade TP304L
Fittings	2" & Smaller	Seamless Wrought SST, Sch 80S, BW Ends, ASTM A403 Class WP-S Grade 304L or Forged SST, 6000#, SW Ends, ASTM A182.	ASTM A403 Class WP-S Grade 304L Grade F 304L ASTM A182 Grade F 304L Dimensions per ANSI B16.9 or B16.11
	1-1/2" and Larger	Seamless Wrought SST, Sch 40S BW Ends.	ASTM A403 Class WP-S Grade 304L Dimensions per ANSI B16.9
		For remainder of specification see Line Class AR Spec. All butt-weld valves shall match the bore of pipe and fittings.	

## PIPING MATERIAL STANDARDS

### Stainless Steel Tubing, 150 - 300 psi Service Rating, Line Class AM

#### Design Notes

1. This specification can be used on original plant process installations where tubing was used (where organics in cells prevent welding of piping components). Note restrictions on use of tubing in 1543 2.3 of this AE Standard.
2. Where corrosion will be excessive or higher pressures or other stresses are encountered, the designer has the option of selecting thicker walled (.065" wall) tubing.
3. Only 304 SST or 316 SST seats will be acceptable for in-cell valves or on steam valves. No TFE in cell.
4. Swagelok<sup>®</sup> compression fittings are required without or equal substitution for make-up of all tubing except where components must be compatible with existing flare fittings (Parker Triple-Lok<sup>®</sup>). Parker Triple-Lok<sup>®</sup> flare fittings may be used in this case only. The intent is to eliminate all flare fittings where possible. See also 1543 2.3.
5. Use tube to pipe weld connectors for fit-up.
6. Alternate disc materials which are suitable for the intended service may be substituted to minimize galling between the seat and disc with prior approval of ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Tube	1/8" - 1"	Stainless Steel MIL-T-8504 Composition 304 or ASTM A269 TP 304, .035" Wall, Seamless.	ASTM A269 TP304 or MIL-T-8504 Comp. 304
Fittings	1/8" - 1"	Stainless Steel, ASTM A276 TP316, Swagelok <sup>®</sup> Compression Fittings.	ASTM A276 TP 316
	1/8" and Larger	Parker Triple Lock <sup>®</sup> flare Fittings	See Note 4
Globe Valves	1/8" - 1" Bellows-Seal	150# - 300# Class, Bellows Sealed BW, 316L Stainless Steel Body, 316 Stainless Steel Disc, Integral Seat, Grafoil <sup>®</sup> Gasket and Packing.	ASTM A351 Grade CF3M ASTM A182 Grade F316L Notes 5 & 6
	1/8" - 1"	150# - 300# Class, SW, OS&Y, BB, 316L Stainless Steel Body and Integral Seat, 316 SST Disc, Grafoil <sup>®</sup> Gasket and Packing.	Same as above
	3/4" Bellows Seal	Nupro <sup>®</sup> 12U Series, Pipe Butt Weld Ends, 316L SST Body, 316 SST Stem Insert. For use as cell wall valve.	
Needle	Valves	Stainless Steel Type 316 forged Body, 3000 PSI Rating, Swagelok <sup>®</sup> X Swagelok <sup>®</sup> Ends, Whitey <sup>®</sup> . For out-of-cell use only.	
Check Valves	1/2" - 1"	150# - 300# Class, Butt Weld and Socket Weld Ends, Swing Type, Bolted Cover, 316L Stainless Steel Body, Integral Seats, 316 Stainless Steel Disc.	ASTM A351 Grade CF3M ASTM A182 Grade F316L Notes 5 & 6
	1/8" - 1"	3000#, Swagelok <sup>®</sup> X Swagelok <sup>®</sup> Ends, Spring Return, 316 SST. For Out-of-Cell Use Only.	
Tubing Bends		Bends shall be minimum 5 times nominal tube diameter.	

## PIPING MATERIAL STANDARDS

### Stainless Steel - 304L, 150 psi Service Rating, Line Class AR

#### Design Notes

1. This specification at the 150# service rating will form the bulk of all process and in-cell utility piping at ICPP.
2. Where corrosion will be excessive or higher pressure or other pipe stresses are encountered, the designer has the option of selecting heavier walled pipe and higher rated valves & fittings. See also line class AD for heavier walled pipe.
3. All external components for valves shall be 304, 316, or approved equal stainless steel.
4. Do not use plug, diaphragm, or butterfly valves for steam service.
5. This line class shall be used in lieu of all or portions of the following line classes. See the Piping Material Specification Line Class List and the specific project specifications for more details.
  - o NWCF Spec. SP-453504-50-3 line classes AD, AE, and AF.
6. Full port ball valves are preferred in fouling services.
7. When using spiral wound gaskets, see Rules for Bolted Flange Connections, ASME Section VIII Div. 1 Appendix 2 or ASME Section VIII Div. 2 Appendix 3 and ASME Section III Div.1, Subsection ND, Section ND-3658 (for equivalent pressure approach) to ensure that the gaskets are applicable for the particular service intended. In cases where spiral wound gaskets are incompatible with the above requirements contact ICPP Design Engineering Organization for further guidance.
8. FPR Line Class AF (304L SST Pipe Sch 10) shall be considered Line Class AR for future installations. Line Class AS in FPR shall be considered Line Class AR for future installations but shall be upgraded to: (Accountability sample bias control governs this wall thickness).  
  
1/2" Pipe Sch 160  
3/4" Pipe Sch 80
9. Material of construction for cell wall block valve bodies on utility lines not contacting process solutions going into cells can be 316 SST or 304 SST instead of 316L SST. (ASTM A351 Grade CF8M or Grade CF8 ASTM A182 Grade F 316 or Grade F 304)
10. Note that in some portions of the original plant process installations, tubing was used. Organics in these in-cell areas may prevent welding on piping components. See line class AM for these cases.
11. For oxygen service all valves shall be prepared, packaged, and tagged "For Oxygen Service."
12. For oxygen service all piping shall be carefully cleaned to be completely free of oil, grease, dirt, or other readily oxidizable foreign material.
13. When ball valves are to be used for cryogenic services use only valves designed specifically for cryogenic service.
14. Examples: R-Con<sup>®</sup> International R-Con<sup>®</sup> connector, Swing-bolt type.
15. Fittings and equipment in this line class for firewater lines or raw water lines supplying fire water mains shall be specified per NFPA-13 and Factory Mutual Data Sheet 2-8N for above ground piping and NFPA 24 and Factory Mutual Data Sheet 3-10 for underground piping in lieu of the fittings and equipment specified herein.

## PIPING MATERIAL STANDARDS

### Stainless Steel - 304L, 150 psi Service Rating, Line Class AR

16. NPT fittings shall be used in-cell only for instruments and equipment (such as pressure gages, pumps, valve actuators etc.) where weld ends are not normally available. Out-of-Cell NPT fittings may be used when upstream of the cell-wall block valve with prior written approval of ICPP Design Engineering Organization.
17. Where required diaphragm valves shall be oriented to allow for free draining.
18. Three hole flanges, fabricated in accordance with Dwg. 1550-CPP-666-P-600, shall be used where remote removal of equipment or components is required.
19. Alternate disc materials which are suitable for the intended service may be substituted to minimize galling between the seat and disc with prior approval of ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/4"-2-1/2"	Seamless Stainless Steel, ASTM A312 Grade TP304L, Sch. 40S, Beveled Ends for BW, Plain Ends for SW, or Screwed.	ASTM A312 TP304L
	3" - 12"	Stainless Steel, ASTM A814 Grade TP304L, Sch. 40, Beveled Ends for BW, Plain Ends for SW or Screwed.	ASTM A814 TP304L
Fittings	2" and Smaller	Seamless Wrought SST, BW Ends, Sch 40S, ASTM A403 Class WP-S Grade 304L or Forged SST, SW Ends, 3000#, ASTM A182 Grade F304L	ASTM A403 Class WP-S Grade 304L ASTM A182 Grade F 304L Dimensions per ANSI B16.9 or B16.11
	2-1/2" and Larger	Seamless Wrought SST, BWE, Sch 40S.	ASTM A403 Class WP-S Grade 304L Dimensions per ANSI B16.9
Gate Valves	2" and Smaller	150# Class, BW or SW Ends, OS&Y, Bolted Bonnet, Integral Seat, Body and Bonnet 316L SST, Casting ASTM A351, Grade CF3M Forgings ASTM A182, Grade F316L Packing Grafoil <sup>®</sup> , Bonnet Gasket Grafoil <sup>®</sup> Disc 316 SST.	ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 See Notes 3, 9, & 19
	2-1/2" and Larger	150# Class, Same as above except BW Ends.	Same as above
	1/2 and Larger	150# Class, RF, OS&Y, Bolted Bonnet, Integral Seat, Body and Bonnet 316 SST Casting ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316, Packing Grafoil <sup>®</sup> Bonnet Gasket Grafoil <sup>®</sup> , Disc 316 SST.	ASTM A351 Grade CF8M ASTM A182 Grade F316 See Notes 3, 7, 9, & 19 ANSI B16.34
	2" and Smaller	150# Class, BW or SW Ends, OS&Y, Bolted Bonnet, Body and Bonnet 316L Stainless Steel, Integral Seat, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, 316 SST Disc, Grafoil <sup>®</sup> Packing, Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF3M ASTM A182 Grade F316L See Notes 3, 9, & 19 ANSI B16.34
	2-1/2" and Larger	Same as above except for BWE	Same as above
	1/2" and Larger	150# Class, RF, OS&Y, Bolted Bonnet, Body and Bonnet 316 SST, Integral Seat, Castings ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316, 316 SST Disc, Grafoil <sup>®</sup> Packing, Bonnet Gasket Grafoil <sup>®</sup> .	ASTM A351 Grade CF8M ASTM A182 Grade F316 See Notes 3, 7, 9, & 19 ANSI B16.34

## PIPING MATERIAL STANDARDS

### Stainless Steel - 304L, 150 psi Service Rating, Line Class AR

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
	1/2" and Larger Bellows Seal	150# Class, BW Ends, SST Bellows Seal Type, OS&Y Bolted Bonnet, Integral Seat, Body and Bonnet 316L Stainless Steel, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, Disc 316 Stainless Steel, Grafoil <sup>®</sup> Packing, Bonnet Gasket Grafoil <sup>®</sup> 3" Long Minimum Pipe Stub Each End.	ASTM A351 Grade CF3M ASTM A182 Grade F316L See Notes 3, 9, & 19 ANSI B16.34
Check Valves	1/2" - 2"	150# Class, BW or SW Ends, Swing Type, Bolted Bonnet, Body and Bonnet 316L Stainless Steel, Integral Seat, Castings ASTM A351, Grade CF3M, Forgings ASTM A182 Grade F316L, Bonnet Gasket Grafoil <sup>®</sup> . Disc 316 Stainless Steel.	ASTM A351 Grade CF3M ASTM A182 Grade F316L See Notes 3, 9, & 19 ANSI B16.34
	2" and Larger	Same as above except for BWE.	Same as above
	1/2" and Larger	150# Class, RF, Swing Type, Bolted Bonnet, Body and Bonnet 316 SST, Integral Seat, castings ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316, Bonnet Gasket Grafoil <sup>®</sup> , Disc 316 SST.	ASTM A351 Grade CF8M ASTM A182 Grade F316 Dimensions per ANSI B16.34 See Notes 3, 7, 9, & 19
Ball Valves	1/2" - 2"	150# Class, BW or SW Ends, 3 Piece, Split Body or Top Entry, Body 316L Stainless Steel, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, 316 SST Ball and stem, Seal and Gasket Grafoil <sup>®</sup> , Seats to be determined for particular service.	ASTM A351 Grade CF3M ASTM A182 Grade F316L See Notes 3, 6, 13, & 9 ANSI B16.34
	2" and Larger	Same as above except BWE.	Same as above
	1/2" and Larger	150# Class, RF, Body, Ball and Stem 316 SST, Castings ASTM A351, Grade CF8M, Forgings ASTM A182 Grade F316, Seal and Gasket Grafoil, Seats to be determined for particular service.	ASTM A351 Grade CF8M ASTM A182 Grade F316 See Notes 3, 6, 13, & 9 ANSI B16.34
Butterfly Valves	2" and larger	150# Class, RF, or Wafer Type Body and Disc 316 SST, Castings ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316, 17-4 PH Stem, Lever-Lock Handle, Seal Rings to be determined for particular service.	ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 See Notes 3, 4, 7, & 9
Plug Valves	1/2" - 2"	150# Class, BW or SW Ends, Body, Cover, and Plug 316L SST, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, Sleeve Material to be determined for particular service.	ASTM A351 Grade CF3M ASTM A182 Grade F316L See Notes 3, 4, & 9 ANSI B16.34
	2" and Larger	Same as above except BWE.	Same as above
	1/2" and Larger	150# Class, RF, Body, Cover, and Plug 316 SST, Castings ASTM A351, Grade CF8M, Forgings, ASTM A182, Grade F316, Sleeve Material to be determined for particular service.	ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 See Notes 3, 4, 7, & 9
Diaphragm	1/2" - 2"	150# Class, BW or SW Ends, Body and Cover 316L SST, Castings ASTM A351, Grade CF3M, Forgings ASTM A182, Grade F316L, Diaphragm Material and packing to be determined for particular service.	ASTM A351 Grade CF3M ASTM A182 Grade F316L ANSI B16.34 See Notes 3, 4, 9, & 17

## PIPING MATERIAL STANDARDS

### Stainless Steel - 304L, 150 psi Service Rating, Line Class AR

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
	2" and Larger	Same as above except BWE.	Same as above
	1/2" and Larger	150# Class, RF, Body and Cover 316 SST, Castings ASTM A351, Grade CF8M, Forgings ASTM A182, Grade F316, Diaphragm and Packing Material to be determined for particular service.	ASTM A351 Grade CF8M ASTM A182 Grade F316 ANSI B16.34 See Notes 3, 4, 7, & 17
Remote Connectors	All Sizes	150# Class, Remotely Operated R-Con <sup>R</sup> Type Connector, 304L or 316L Stainless Steel Butt Weld Hubs, 316 Stainless Steel Seal Rings and Clamps, Nitronic 60 <sup>R</sup> Screw, Schedule 40S Bore.	Note 14
Flanges	All Sizes	150# ANSI B16.5, RF, Slip-On, Weld Neck, or Lap Joint and Stub-End Forged 304L SST.	ASTM A182 Grade F304L Note 7 & 18 ANSI B16.5
Orifice Flanges	All Sizes	300# ANSI B16.5, Raised Face Weld-Neck, Type, Forged Stainless Steel with 1/2" Socket Weld Taps, Schedule 40S Bore.	ASTM A182 Grade F304L ANSI B16.36
Gaskets	All Sizes	Spiral Wound Metallic Type, 304L SST Spiral Windings with Grafoil <sup>R</sup> Filler, 304 SST Centering Guide.	ASTM A182 Grade F304L API-601 Note 7
	All Sizes	Grafoil <sup>R</sup>	ANSI B16.21
Bolting		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Gr B8 ASTM A194 GR 8S UNS S21800
Line Reduction		Eccentric Reducers Shall be used where entrapment of contaminated substances can occur	
Branches	<u>Run Size</u>	<u>Branch Size</u> <u>Use</u>	
	Run Size 2" and smaller	Full size or reducing              Tee Full size                                  Tee	
	Larger than 2"	2" and smaller                      Saddle Larger than 2"                      Stub-in (a)	ANSI B.31.3 Fig. 327.4.6D
		(a) When reinforcement is required use tees or socket-weld or butt-weld saddles in lieu of stub-in.	

## PIPING MATERIAL STANDARDS

### Carpenter 20 Cb3<sup>R</sup> Stainless Steel, 150 psi Service Rating, Line Class CA

#### Design Notes

1. Examples: R-Con<sup>R</sup> Connector, R-Con<sup>R</sup> International, Swing-bolt Type.
2. Plug valves shall not be used in steam service.
3. Three hole flanges, fabricated in accordance with Dwg. 1550-CPP-666-P-600 shall be used where remote removal of equipment or components is required.
4. All external components for valves shall be 304, 316, or approved equal SST.
5. When using spiral wound gaskets, See Rules for Bolted Flange Connections, ASME Section VIII Div. 1 Appendix 2 or ASME Section VIII Div. 2 Appendix 3 and ASME Section III Div.1, Subsection ND Section ND-3658 (for equivalent pressure approach) to ensure that the gaskets are applicable for the particular service intended. In cases where spiral wound gaskets are incompatible with the above requirements contact ICPP Design Engineering Organization for further guidance.
6. Pipe stub wall thickness shall be the same as connecting pipe.
7. Alternate disc materials which are suitable for the intended service may be substituted to minimize galling between the seat and disc with prior approval of the ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/4" - 3/4"	Carpenter 20 Cb-3 <sup>R</sup> , Seamless SCH 80S UNS NO8020	ASTM 729
	1" and Larger	Carpenter 20 Cb-3 <sup>R</sup> , Seamless SCH 40S.	ASTM 729 UNS NO8020
Fittings	1/4" - 3/4"	Carpenter 20 Cb-3 <sup>R</sup> , BW, SCH 80S	ASTM B366 Grade WP20CB
	1" and Larger	Carpenter 20 Cb-3 <sup>R</sup> , BW, SCH 40S.	Same as above
Gate Valves	All Sizes	150# Class, BW, OS&Y, BB, Carpenter 20 Cb-3 <sup>R</sup> Body, Bonnet and Disc, Integral Seat Grafoil <sup>R</sup> Packing and Gasket.	ASTM B462 UNS NO8020 ASTM A351 Grade CN7M ANSI B16.34 See Notes 4, 6, & 7
	1/2" and Larger	150# Class, RF, OS&Y, BB, Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Packing and Gasket.	See Notes 4, 5, & 7
Globe Valves	All Sizes	150#, Class, BW, OS&Y, BB Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Packing and Gasket.	Same as above ANSI B16.34 See Notes 4, 6, & 7
	1/2" and Larger Bellows-Seal	150# Class, BW, Bellows Sealed OS&Y, BB, Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, and Bellows, Grafoil <sup>R</sup> Gasket. Shall be provided with factory welded 3 inch long Carpenter 20 Cb-3 <sup>R</sup> pipe stub on each end.	Same as above
	1/2" and Larger	150# Class, RF, OS&Y, BB, Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet and Disc, and Integral Seat, Grafoil <sup>R</sup> Gasket.	Same as above ANSI B16.34 See Notes 4, 5, & 7
Check Valves	All Sizes	150# Class, BW, Swing Type, Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Gasket.	Same as above ANSI B16.34 See Notes 4, 6, & 7

## PIPING MATERIAL STANDARDS

### Carpenter 20 Cb3<sup>R</sup> Stainless Steel, 150 psi Service Rating, Line Class CA

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
	1/2" and Larger	150# Class, RF, Wafer Check, Carp. 20 Cb-3 <sup>R</sup> Body, Trim and Plates, Metal to Metal Seal, S/S Spring.	ANSI 16.34 See Notes 4 & 5
Ball Valves	All Sizes	150# Class, BW, Carpenter 20 Cb-3 <sup>R</sup> Body, Ball and Stem, Lever Operated. Seats and Body Seals to be determined for particular service.	Same as above ANSI B16.34 See Notes 4 & 6
	1/2" and Larger	150# Class, RF, Carp. 20 Cb-3 <sup>R</sup> Body, Ball and Stem, Lever Operated. Seats and Seals to be Determined for particular service.	ASTM B462 UNS NO8020 Grade CN7M UNS NO802 ANSI B16.34 See Notes 4 & 5
Butterfly Valves	All Sizes	150# Class, Single Flanged Lug Type, Carp. 20 Cb-3 <sup>R</sup> Body and Disc, 17-4 pH Stem, Grafoil <sup>R</sup> Seal Rings, Grafoil <sup>R</sup> Packing.	Same as above ANSI B16.34 See Notes 4 & 5
Plug Valves	All Sizes	150# Class, BW, Carp. 20 Cb-3 <sup>R</sup> Body, Cover, and Plug, Wrench Operated, 4" and Larger Gear Operated. Sleeve and Diaphragm Material to be determined for particular service.	Same as above ANSI B16.34 See Notes 2, 4, & 6
	1/2" and Larger	150# Class, RF, Carp. 20 Cb-3 <sup>R</sup> Body, Cover, and Plug, 4" and Larger Gear Operated. Sleeve and Diaphragm Material to be determined for particular service.	Same as above ANSI B16.34 See Notes 2, 4, & 5
Diaphragm Valves	All Sizes	150# Class, BW, Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet, and Stem, Weir Type, Diaphragm Material to be determined for particular service.	ANSI B16.34 See Notes 4 & 6
	1/2" and Larger	150# Class, RF, Carp. 20 Cb-3 <sup>R</sup> Body, Bonnet and Stem, Weir Type, Diaphragm Material to be determined for particular service.	ANSI B16.34 See Notes 4 & 5
Remote Connectors		150# Class, Remotely Operated R-Con <sup>R</sup> Type Connector, Carpenter Cb-3 <sup>R</sup> Butt Weld Hubs and Seal Rings, 316 Stainless Steel Clamps, Nitronic 60 <sup>R</sup> Screw.	See Note 1
Flanges		150# ANSI B16.5, Carp. 20 Cb-3 <sup>R</sup> , RF, Weld neck or Lap Joint and Stub End.	ASTM B462 UNS NO8020 ANSI B16.5 See Note 3
Orifice Flanges		300# ANSI Raised Face Weld-neck Type, Forged, Carpenter 20 Cb-3 <sup>R</sup> , ASTM B462 with 1/2" SCRD Taps.	ASTM B462 UNS NO8020 ANSI B16.36
Gaskets		Grafoil <sup>R</sup> Flange Gaskets, Flat Ring, 1/16" Thick.	ANSI B16.21
	All Sizes	Spiral Wound Metallic Type, Carpenter 20 Cb-3 <sup>R</sup> Spiral Windings with Grafoil <sup>R</sup> Filler, 304 SST Centering Guide.	ASTM B366 Grade WP 20CB API-601 Note 5
Bolting		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Gr B8 ASTM A194 Gr 8S UNS S21800
Branches	All Sizes	Use full or reducing tees.	
Line Reductions		Use reducers. Eccentric reducers shall be used where entrapment of contaminated substances can occur.	



## PIPING MATERIAL STANDARDS

### Hastelloy C-4<sup>R</sup> or C-22<sup>R</sup>, 150 psi Service Rating, Line Class HC

#### Design Notes

1. These pipe wall thicknesses are suggested only. The designer shall choose specific pipe wall thicknesses for the particular corrosion service and pressure rating and other piping stresses.
2. Due to lack of availability of C-4 and increased corrosion resistance, Hastelloy C-22<sup>R</sup> shall replace C-4 where applicable.  

Hastelloy C-4<sup>R</sup> (UNS NO6455)  
Hastelloy C-22<sup>R</sup> (UNS NO6022)
3. Examples: R-Con International R-Con<sup>R</sup> Connector, swing-bolt type.
4. NDE requirements on all line class HC systems shall be 100% radiography on all butt weld joints and 100% LP examination on all socket weld joints.
5. All external components for valves shall be 304, 316 or approved equal stainless steel.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/8" - 3/4"	Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Solution Annealed Beveled Ends SCH 160 Seamless.	ASTM B622 UNS NO6455 UNS NO6022
	1" - 2"	Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Solution Annealed Beveled Ends SCH 80 Seamless.	ASTM B622 UNS NO6455 UNS NO6022
	2-1/2" and Larger	Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Solution Annealed Beveled Ends SCH 40 Seamless.	ASTM B622 UNS NO6455 UNS NO6022
Orifice Flanges		300# ANSI B16.5, RF, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Weld Neck Type to Match Pipe Schedule with Socket Weld Taps. Dimensions per ANSI B16.5.	ASTM B574 UNS NO6455 UNS NO6022 ASTM B575 UNS NO6455 UNS NO6022 ANSI B16.36
Gaskets		Grafoil <sup>R</sup> Flange Gasket, Flat Ring 1/16"	ANSI B16.21
Bolting		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Gr B8 ASTM A194 GR 8S UNS S21800
Branches		Use full or reducing tees or saddles.	
Fittings	1/8" - 3/4"	Seamless Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> solution Annealed Butt Welded Ends, Sch 160.	ASTM B366 WPHC4S UNS NO6455 WPHC22S UNS NO6022 Dimensions per ANSI B16.9
	1" - 2"	Seamless Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Solution Annealed Butt Welded Ends, Sch 80.	Same as above
	2-1/2" and Larger	Seamless Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Solution Annealed Butt Weld Ends, Sch 40.	Same as above
Gate Valves	1/2" and Larger	150# Class, BW to Match Schedule of Pipe, OS&Y, BB, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Packing and Gasket.	Same as above ANSI B16.34 Note 5
	Same as above	150# Class, RF, OS&Y BB, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Packing and Gasket.	Same as above ANSI B16.34 Note 5

## PIPING MATERIAL STANDARDS

**Hastelloy C-4<sup>R</sup> or C-22<sup>R</sup>, 150 psi Service Rating, Line Class HC**

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Globe Valves	1/2" and Larger	150# Class, BW to match Schedule of Pipe, OS&Y, BB, Bellows Seal, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet, Disc and Bellows, Grafoil <sup>R</sup> Gasket, Integral Seat.	Same as above ANSI B16.34 Note 5
	Same as above	150# Class, BW to Match Schedule of OS&Y, BB, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Packing and Gasket.	Same as above ANSI B16.34 Note 5
	Same as above	150# Class, RF, OS&Y, BB, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet and Disc, Integral Seat, Grafoil <sup>R</sup> Packing and Gasket.	Same as above ANSI B16.34 Note 5
Check Valves	1/2" and Larger	150# Class, BB, BW to match Schedule of Pipe, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet and Disc, Grafoil <sup>R</sup> Gasket.	Same as above ANSI B16.34 Note 5
	Same as above	150# Class, RF, BB, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Bonnet and Disc, Grafoil <sup>R</sup> Gasket.	Same as above ANSI B16.34 Note 5
Ball Valves	1/2" and Larger	150# Class, BW to match Schedule of Pipe, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Body, Ball and Stem, Lever Operated, Seats and Seals to be determined for particular service.	ASTM B366 WPHC4S UNS NO6455 ASTM B366 WPHC22S UNS NO6022 ANSI B16.34 Note 5
	1/2" and Larger	150# Class, RF, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> , Body, Stem and Ball Lever Operated, Seats and Seals to be determined for particular service.	Same as above
Remote Connections		150#, Remotely operated R-Con <sup>R</sup> Type Connector, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Butt Weld Hubs and Seal Rings, 316 or 304 Stainless Steel Clamps, Nitronic 60 <sup>R</sup> Screw.	ASTM B574 UNS NO6455 UNS NO6022 Note 3
Flanges		150# ANSI B16.5, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> Stub End for Use w/Slip-on Flanges to make a Lap Joint or Van Stone Flanged Connection to Vessels, Valves, Pumps, or other Flanged Equipment.	ASTM B575 UNS NO6455 UNS NO6022 ASTM B574 UNS NO6455 UNS NO6022 Dimensions per ANSI B16.5
		150# ANSI B16.5, Hastelloy C-4 <sup>R</sup> or C-22 <sup>R</sup> RF, Weld Neck to match Pipe Schedule.	ASTM B575 UNS NO6455 UNS NO6022 ASTM B574 UNS NO6455 UNS NO6022 Dimensions per ANSI B16.5

## PIPING MATERIAL STANDARDS

### Hastelloy G-30<sup>R</sup>, 150 psi Service Rating, Line Class HG

#### Design Notes

1. These pipe wall thicknesses are suggested only. The designer shall choose specific pipe wall thicknesses for the particular corrosion service, piping stresses, and pressure rating.
2. Note that original installation on LET&D project used Hastelloy G-30<sup>R</sup> welded seam pipe 1/2" thru 2-1/2" per ASTM B619 class II with 20% minimum cold reduction and eddy-current testing and 3" thru 8" pipe per ASTM B619 Class I with eddy-current testing. Seamless pipe per ASTM B622 is now available up to 4".
3. Eddy-current testing or 100% weld x-ray required.
4. Liquid penetrant test on root and final pass of welds is required. 100% x-ray test on final weld is required.
5. Note that original installation on LET&D project allowed either WPHG30S fittings made from ASTM B622 seamless pipe or WPHG30WX fittings made from ASTM B619 Class I welded seam pipe for 3" to 8" pipe. For future installations all fittings 1/4" to 4" shall be WPHG30S made from ASTM B622 seamless pipe.
6. Flange surfaces shall be finished to 125 microinches AARH for seating to spiral wound gaskets.
7. This gasket for use at LET&D where concentrated nitric acid is encountered and radiation levels are negligible. For radiation service consult ICPP Design Engineering Organization for a more suitable material. When using spiral wound gaskets, see Rules for Bolted Flange Connections, ASME Section VIII Div. 1 Appendix 2 or ASME Section VIII Div 2 Appendix 3 and ASME Section III Div.1, Subsection ND, Section ND-3658 (for equivalent pressure approach) to ensure that the gaskets are applicable for the particular service intended. In cases where spiral wound gaskets are incompatible with the above requirements contact ICPP Design Engineering Organization for further guidance.
8. All external components for valves shall be 304, 316, or approved equal stainless steel.
9. Note that 316L SST and Carpenter 20 Cb-3<sup>R</sup> ball valves were installed where the corrosion service allowed it as original equipment at LET&D due to lack of availability of Hastelloy G-30<sup>R</sup> valves. For all future work Hastelloy G-30<sup>R</sup> is required unless it can be demonstrated that the above materials are adequate for the particular corrosion service. Prior written approval is required from ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/4"	Hastelloy G-30 <sup>R</sup> , ASTM B622 UNS NO6030, Seamless, Sch. 80S, Heat Treated and Descaled.	ASTM B622 UNS NO6030
	1/2" - 4"	Hastelloy G-30 <sup>R</sup> , ASTM B622 UNS NO6030 Seamless, Sch. 40S, Heat Treated and Descaled.	ASTM B622 UNS NO6030
	5" - 8"	Hastelloy G-30 <sup>R</sup> , ASTM B619 UNS NO6030 Class I, Welded Seam, Sch. 40S, Heat Treated and Descaled.	ASTM B619 UNS NO6030 See Note 3
	10" - 14"	Hastelloy G-30 <sup>R</sup> , UNS NO6030, Welded Seam from ASTM B582 material using Hastelloy G-30 <sup>R</sup> Weld Filler Material Sch. 10S, Heated Treated and Descaled. Outside diameter (O.D.) shall be within the Requirements of ASTM A530 Table I "Permissible Variations of Outside Diameters" of the O.D.'s Specified in ANSI B36.19.	ASTM B582 UNS NO6030 See Note 4 ASTM A530 ASTM B36.19

## PIPING MATERIAL STANDARDS

### Hastelloy G-30<sup>R</sup>, 150 psi Service Rating, Line Class HG

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Fittings	1/4"	Hastelloy G-30 <sup>R</sup> , UNS NO6030, ASTM B366, Class WPHG30S from ASTM B622 Seamless Pipe, Sch. 80S, Butt Weld Ends.	ASTM B366 Class WPHG30S UNS NO6030 ASTM B622 Dimensions per ANSI B16.9
	1/2" - 4"	Hastelloy G-30 <sup>R</sup> , UNS NO6030, ASTM B366 Class WPHG30S from ASTM B622 Seamless Pipe, Sch. 40S Butt Weld Ends.	Same as above
	5" - 8"	Hastelloy G-30 <sup>R</sup> , UNS NO6030, ASTM B366 Class, WPHG30WX from ASTM B619 Class I Welded Seam Pipe, Sch. 40S, Butt Weld Ends.	ASTM B366 Class WPHG30WX UNS NO6030 ASTM B619 Dimensions per ANSI B16.9
	10" - 14"	Hastelloy G-30 <sup>R</sup> , UNS NO6030, ASTM B366 Class WPHG30WX from ASTM B582 Material, Sch 10S, Butt Weld Ends.	ASTM B366 Class WPHG30WX UNS NO6030 ASTM B582 Dimensions per ANSI B16.9
Gaskets	All Sizes	Spiral Wound Metallic Type, Hastelloy G-30 <sup>R</sup> Spiral Windings with TFE Filler, 304 SST Centering Guide.	API-601 ASTM B582 UNS NO6030 See Note 7
	All Sizes	Grafoil <sup>R</sup>	ANSI B16.21
Bolting		Use 304 SST Bolts ASTM A193 GR B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 GR 8S (UNS S21800).	ASTM A193 GR B8 ASTM A194 GR 8S UNS S21800
Gate Valves	All Sizes	150# Class R.F. Bonneted Knife Gate Bi-Direction, Close Bonnet and Body Fabricated (not cast) Carpenter 20Cb-3 <sup>R</sup> , Internal Gate Wiper Between Body and Bonnet and Multiple Rows of Stem Packing. Viton <sup>R</sup> Steel Belted Radial Seats.	ASTM B462 UNS-08020 ASTM B463 UNS-08020 ASTM B472 UNS-08020 ANSI B16.34 See Notes 6 & 8
Globe Valves	All Sizes	150# Class, Body, Bonnet and Disc Fabricated (not case) Carpenter 20 Cb-3 <sup>R</sup> , Flanged or B.W., Seats and Seals Shall be determined for the service intended.	ASTM B462 UNS-08020 ASTM B463 UNS-08020 ASTM B472 UNS-08020 See Notes 6 & 8
Ball Valves			ASTM B581 UNS-NO6030 ASTM B462 or 472 ANSI B16.34 Notes 8 & 9

## PIPING MATERIAL STANDARDS

### PVC Pressure Pipe, Line NA Class 200

#### Design Notes

1. To be used for underground pressurized fire water lines only.
2. Installation shall be per manufacturer's instructions.
3. PVC pipe shall be bedded all around with 4" to 6" of sand.
4. This line class shall not be used in contact with or within 10' of 300 series stainless steel line classes to avoid chloride contamination.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	4" - 12"	Polyvinyl Chloride (PVC) Pressure Pipe, Class 200, Bell and Spigot Ends. As manufactured by J-M Manufacturing Co. Inc. Blue Brute <sup>®</sup> or equal.	AWWA C900 UL Listed and Factory Mutual approved for fire protection service.
Fittings	4" - 12"	Ductile Iron per Line Class NR.	

## PIPING MATERIAL STANDARDS

### Carbon Steel - ECTFE Lined (Harlar<sup>R</sup>), 150 psi Service Rating, Line Class NB

#### Design Notes

1. Manufacturer's suggested bolt torque shall be used in assembling flange joints.
2. No gaskets are normally required between flanges with molded raised faces. Before disconnecting flanges scribe match marks in flange sides to ensure exact line-up when reconnected.
3. Threaded flanges are to be used only on field fit spool pieces to make final connections to flanged pipe.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1" - 10"	Carbon Steel Sch. 40 with ECTFE lining, 150# ANSI B16.5 wrought steel Van Stone (lap joint) flanged ends with molded raised face.	ASTM A587 ASTM A234 ANSI B16.5
Fittings	1" - 10"	Wrought steel Van Stone (lap joint) flanged fittings, 150# ANSI B16.5 lined with ECTFE, molded raised face.	ASTM A234 ANSI B16.5
Flanges Blind Flanges & Reducing Flanges	1" - 10"	Forged Carbon Steel Van Stone (lap joint) and Threaded Flanges with ECTFE Lining, 150# ANSI B16.5, Molded Raised Face.	ASTM A105 or A181 ANSI B16.5 See Note 3
Plug Valves	All Sizes	150# Class Molded Raised Face Flanged Cast Steel with ECTFE Lining, PFA Coated Plug (or other coating suitable for service intended).	ASTM A216 Grade WCB ANSI B16.34
3-Way Plug Valves	All Sizes	150# Class Molded Raised Face Flanged, Cast Steel or Ductile Iron with ECTFE Lining, PTFE Coated Plug (or other coating suitable for intended service).	ASTM A395 or A216 Grade WCB
Bolting		Hexhead Machine Bolt with Hex Nut, Chrome-moly Steel.	ASTM A193 Grade B7 ASTM A194 Grade 2H
Branches		Use Full or Reducing ECTFE Lined Flanged Fittings.	

## PIPING MATERIAL STANDARDS

### Carbon Steel-Weld Fittings, 150 psi Service Rating, Line Class NC

#### Design Notes

- Line Class NC at FPR included only socket-weld fittings. This line class shall be used for future work.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	All Sizes	Seamless Carbon Steel, Sch. 40, Plain Ends.	ASTM A106 Grade B
Fittings	2" & Smaller	3000# Carbon Steel, Forged, Socket-Weld or Butt Weld Ends.	ASTM A105
	2-1/2" and Larger	Seamless Wrought Carbon Steel, Butt Weld Ends.	ASTM A234 Grade WPB
Gate Valves	All Sizes	800# Class, Forged Steel, SW or BW, OS&Y, BB, Grafoil <sup>R</sup> Packing & Gaskets, Trim for Steam Service.	ASTM A105 ANSI B16.34
	Same as above	150# Class, Cast Steel, BW, OS&Y, BB, Standard Trim, Grafoil <sup>R</sup> Packing and Gaskets.	ASTM A216 ANSI B16.34
	3" & Larger	150# Class, Cast Steel, Flanged OS&Y, BB, STD Trim, Grafoil <sup>R</sup> Packing and Gaskets.	Same as above
Globe Valves	All Sizes	800# Class, Forged Steel, SW or BW, OS&Y, BB, Renewable Disc & Seat, Grafoil <sup>R</sup> Packing and Gasket, Trim for Steam Service.	ASTM A105 ANSI B16.34
	Same as above	150# Class, Cast Steel, BW, OS&Y, BB, Standard Trim, Grafoil <sup>R</sup> Packing and Gaskets.	ASTM A216 ANSI B16.34
	3" & Larger	150# Class, Cast Steel, Flanged, OS&Y, BB, Standard Trim, Grafoil <sup>R</sup> Packing and Gaskets.	Same as above
Check Valves	All Sizes	800# Class, SW or BW, Piston or Lift Type, Forged Steel, Trim, for Steam Service Grafoil <sup>R</sup> .	ASTM A105 ANSI B16.34
	Same as above	150# Class, Cast Steel, BW, BB, Standard Trim, Swing Type, Grafoil <sup>R</sup> Gaskets.	ASTM A216 ANSI B16.34
	3" & Larger	150# Class, Flanged, Cast Steel, Swing Type, Bolted Cap, Swing Type, Grafoil <sup>R</sup> Gasket.	Same as above
Flanges	All Sizes	150# ANSI B16.5, RF, Forged CS Weld Neck, All Sizes Slip-on or SW.	ASTM A181 ASTM A105 ANSI B16.5
Orifice Flanges	2" - 8"	Forged Carbon Steel, 300# Raised Face, Bored to match pipe.	ASTM A105 ANSI B16.36
Gaskets	1/2" - 24"	Grafoil <sup>R</sup> Gaskets, 1/16" Thick.	ANSI B16.21
		Note: Use 300# Ring Type with Orifice Flanges.	
Bolting		Chrome-moly, Stud Bolt Threaded Full Length Two Semi-Finished Heavy Hex Nuts Each.	ASTM A193 Grade B7 ASTM A194 Grade 2H
	Run Size	Branch Size	Use
Branch Connections	2" & Smaller	Full Size or Reducing Full	Tee Tee

## PIPING MATERIAL STANDARDS

### Carbon Steel-Weld Fittings, 150 psi Service Rating, Line Class NC

TYPE	PIPE SIZE	MATERIAL DESCRIPTION		CODE
	Larger than 2"	2" and Smaller Larger than 2"	Saddle Stub-in	



## PIPING MATERIAL STANDARDS

### Chlorinated Polyvinyl Chloride (CPVC) CPVC (Temperature Limit 180EF) Line Class ND

#### Design Notes

1. When assembling nonmetallic flanges, flat washers shall be used under all bolt heads & nuts.
2. When plastic pipe is used for potable water in buildings, CPVC shall be used on all hot and cold potable water piping.
3. Bronze or iron body valves may be used at designers options.
4. Use CPVC primer and cement for solvent welding of SW fittings.
5. See manufacturers recommendations for cleaning and joining CPVC pipe and fittings.
6. This line class shall not be used in contact with or within 10' of 300 series austenitic stainless steel line classes to avoid chloride contamination.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/2" - 6"	Hi Temperature CPVC, Plain Ends for SW (Preferred) or SCRD. Schedule 80.	ASTM F441
Fittings	1/2" - 3"	CPVC Fittings, SW (Preferred) or SCRD, Schedule 80.	ASTM F437 or ASTM F439
	1" - 6"	CPVC Fittings, 150# ANSI B16.5 Flanged, Schedule 80 SW (Preferred) or SCRD.	Same as above ANSI B16.5
Ball Valves	1/2" - 4"	CPVC, SCRD, SW or Flanged. True Union Type.	See Note 3
Flanges	1/2" - 6"	CPVC, SW (Preferred) or SCRD 150# ANSI B16.5.	ASTM F437 or ASTM F439 See Note 1 ANSI B16.5
Gaskets		TFE, Full Face - Non Radiation Use Only	
Bolting		Carbon Steel Bolts & Nuts	See Note 1 ASTM A307 Grade B

## PIPING MATERIAL STANDARDS

### Vitrified Clay, Extra Strength Uniform Building Code, Line Class NE

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" - 4"	Vitrified Clay Pipe, Extra Strength	ASTM C700
Fittings	2" - 4"	Vitrified Clay, Extra Strength Molded Rubber Compression Joints	ASTM C700 ASTM C425

## PIPING MATERIAL STANDARDS

### Carbon Steel - Polypropylene Lined (PPL), 150 psi Service Rating, Line Class NF

#### Design Notes

1. All spool assemblies involving lined piping shall be fabricated from PPL lined carbon steel pipe w/150# ductile iron flanges and flanged ductile iron, or cast steel PPL lined fittings.
2. Straight sections of pipe available in standard spool lengths of 10 feet and 20 feet.
3. Manufacturer's suggested bolt torque shall be used in assembling flange joints.
4. No gaskets required between flanges with molded raised faces.
5. The following pressure limitations shall be followed for diaphragm valves at 100°F.

<u>Size</u>	<u>Max. Pressure</u>	<u>Size</u>	<u>Max. Pressure</u>
1/2"-1"	200 psig	3"-4"	150 psig
1-1/2"-2"	175 psig	6" only	125 psig

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1" - 6"	Carbon Steel, Standard Weight, lined with Polypropylene, 150# ANSI B16.5 Screwed Ductile Iron Flange Ends.	ASTM A53 Grade B ASTM A395 ANSI B16.5
Fittings	1" - 6"	Ductile Iron Flanged Fittings, 150# ANSI B16.5 Lined with Polypropylene, Molded Raised Face.	ASTM A395 ANSI B16.5
Check Valves		150# Class, RF, Cast Steel, Polypropylene Lined.	ASTM A216 Grade WCB Dimensions per ANSI B16.34
Plug Valves	1" - 4"	150# Class, RF, Cast Steel, Polypropylene Lined Furnished with Wrench.	ASTM A 216 Grade WCB Dimensions per ANSI B16.34
	6" only	Same as above except furnished with enclosed worm gear operator.	
Diaphragm Valves	1/2" - 6"	150# Class, RF, Polypropylene Lined Cast Carbon Steel, Hand Wheel Operated. 1/2" - 6"	ASTM A216 Grade WCB Dimensions per ANSI B16.34
Flanges (Loose)	1" - 6"	150# ANSI B16.5, Ductile Iron, Screwed, Chamfered Acceptable: DOW #520 <sup>R</sup> or equal. To be used with Polypropylene Lining.	ASTM A395 ANSI B16.5
	1" - 6"	150# ANSI B16.5, Ductile Iron Blind Flanges, (use with Polypropylene Full Face Blind Spacer) Acceptable: DOW #522 <sup>R</sup> or equal.	ASTM A395 ANSI B16.5
Orifice Flanges (Loose)		300# ANSI B16.5, Ductile Iron, Screwed, Chamfered with 1/2" SCRD Taps. To be used with Polypropylene Lining.	ASTM A395 ANSI B16.36
Spacers		Use Standard Full-Face or Reducing Full Face PPL Spacer when mating PPL lined piping items with all other types of flanged piping.	
Bolting		Hex Head Machine Bolt with Hex Nut.	ASTM A307 Grade B
Branches	1" - 6"	Use Full or Reducing PPL Lined Flanged Fittings.	

## PIPING MATERIAL STANDARDS

### Polyethylene (Very High Molecular Weight High Density Polyethylene) Line Class NH

#### Design Notes

1. VHMWHD Polyethylene used for service waste shall be used only in out-of-cell areas and only where compatible with the service waste material.
2. See ASME B31.3 Chapter VII "Nonmetallic Piping and Piping Lined with Non-metals" and ICPP Materials Development Organization for further direction on specifying material for the intended application and obtain prior written approval of ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	3/4" - 14"	VHMWHD Polyethylene as manufactured by Phillips Driscopipe No. 8600 <sup>R</sup> or equal. Pressure Rating 110 psi. 160 psi or as required.	None
Fittings	All Sizes	VHMWHD Polyethylene as manufactured by Phillips Driscopipe No. 8600 <sup>R</sup> or equal. Pressure Rating to match pipe system rating. Ends suitable for butt-fusion.	None
Special Fittings		Molded Stub Ends of VHMWHD Polyethylene as manufactured by Phillips - Driscopipe No. 8600 <sup>R</sup> or equal shall be used in conjunction with Slip-on Flanges for interface between VHMWHDPE Pipe and Metallic Pipe. Pressure Rating to match pipe system rating.	None
Flanges		Slip-On (Flat Metal Plate) 304 SST 150 psi Driscopipe <sup>R</sup> or equal.	ANSI B16.21
Gaskets		Gylon <sup>R</sup> , Ring Type, 1/16" Thick 150 psi	ANSI B16.21
Bolts		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800)	ASTM A193 Gr B8 ASTM A194 Gr 8S UNS S21800

## PIPING MATERIAL STANDARDS

### Concrete, Line Class NI

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	4" & Larger	Concrete Sewer, Storm Drain, and Culvert Pipe	ASTM C14
Joints	4" & Larger	Joints for ASTM C443 Sewer, Storm drain and culvert pipe shall be rubber gasketed belled ends.	ASTM C443

## PIPING MATERIAL STANDARDS

### Galvanized Carbon Steel, 125 - 150 psi Service Rating, Line Class NJ

#### Design Notes

1. Fittings and equipment in this line class for firewater lines or raw water lines supplying fire water mains shall be specified per NFPA-13 and Factory Mutual Data Sheet 2-8N for above ground piping and NFPA 24 and Factory Mutual Data Sheet 3-10 for underground piping in lieu of the fittings and equipment specified herein.
2. For ASME B31.3 Base Category fluids see ASME B31.3 Table 314.2.1 for minimum pipe schedule requirements instead of those listed below. Match fitting class to pipe rating.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/2" - 4"	Carbon Steel, Galvanized, Sch 40, Threaded and Coupled Ends.	ASTM A53
Fittings	All sizes	150# Class, Galvanized Malleable Iron Screwed.	ASTM A197
Gate Valves	All Sizes	125# Class Bronze, SCRD, Double Wedge, Rising Stem.	ASTM B62
	Same as above	125# Class, Iron Body, Flat-Faced Flanged, Double Wedge, Non-Rising Stem, Bronze Trim.	ASTM A126 Class B
	Same as above	125# Class, Iron Body, Flat-Faced Flanged, OS&Y Bolted Bonnet, Rising Stem, Solid Bronze Disc, Trim and Seats.	ASTM A126 Class B
Globe Valves	All Sizes	125# Class, Bronze, SCRD, Rising Stem, Bronze Disc and Seats, GrafoiL <sup>®</sup> Packing and Gasket.	ASTM B62
	Same as above	150# Class, Bronze, SCRD, Rising Stem, Renewable Composition Disc, Bronze Seat, GrafoiL <sup>®</sup> Packing and Gasket.	ASTM B62
	Same as above	125# Class, Iron Body, Raised Face Flanged, OS&Y Bolted Bonnet, Rising Stem, Composition Disc & Seats.	ASTM B62
Check Valves	All Sizes	125# Class, OS&Y, Bronze, Screwed, Full Way Bronze Discs and Seats.	ASTM B62
	Same as above	150# Class, Bronze, Screwed, Renewable Composition Disc, Seats.	ASTM B62
	All Sizes	125# Class, Iron Body, Bronze Mtd., Flanged, Horizontal Swing.	ASTM B62
Service Stops	Same as above	125# ANSI, Bronze, SCRD, Square or Flat Head.	ASTM B62
		125# ANSI, Iron Body, SCRD, Square Head.	ASTM A126 Class B
Ball Valves	1/4" - 2"	300# Class WOG, SCRD, Bronze Body TFE Seats and Seals, Lever Operated.	ASTM B62
	3" - 4"	150# Class, Raised-Face Flange, Ductile Iron Body, TFE Seat, Top Entry, Lever Operated.	ASTM A395
Plug Valves	1/2" - 2"	200# Class, SCRD, Cast Iron Body and Plug, TFE Sleeve and Diaphragm, Lever operated.	ASTM A126 Class B
Flanges	2" - 4"	Galvanized Malleable Iron 150# FF, Screwed Flange.	ASTM A105

## PIPING MATERIAL STANDARDS

### Galvanized Carbon Steel, 125 - 150 psi Service Rating, Line Class NJ

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Orifice Flanges	All Sizes	Forged Carbon Steel, 300# RF, Weld Neck Type, with 1/2" SCRD Tops, with bore to match Pipe.	ASTM A105
Gaskets	1/4" - 6"	Grafoil <sup>R</sup> flange gasket, flat ring, 1/16" Thick.	ANSI B16.21
Bolting		Hex head machine bolt with hex nut.	ASTM A307 Grade B
Branches	1/4" - 2"	For full size or reducing branch, use full or reducing tee.	
	3" - 6"	For full size branch, use full size tee.	

## PIPING MATERIAL STANDARDS

### Copper Water Tubing Type L or K, Line Class NK

#### Design Notes

1. Note restrictions on use of tubing in Section 5.6.2 of this A-E Standard.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Tubing	1/4" - 2"	Seamless Copper Water Tubing, Hard Drawn or Soft Drawn, Type L or K Straight Length or Coil.	ASTM B88
Fittings	1/4" - 2"	Wrought Copper or Bronze Solder - Type Pressure Fittings.	ANSI B16.22
Soldering Material		Silver Brazing Wire.	
Gate Valves	1/4" - 2"	125# Class, Bronze, Double Wedge Rising Stem Screwed-In Bonnet, Solder Joint Tubing End or SCRD.	ASTM B62
Globe Valves	1/4" - 2"	150# Class, Bronze, Renewable Composition Disc, Rising Stem, Union Bonnet, Solder Joint Tubing End or SCRD.	ASTM B62
Check Valves	1/4" - 2"	125# Class, Bronze, Screwed-In Cap, Bronze Disc, Solder Joint Tubing End or SCRD.	ASTM B62



## PIPING MATERIAL STANDARDS

### Polypropylene, Line Class NL

#### Design Notes

1. Polypropylene piping systems shall be fabricated in strict accordance with the manufacturer's recommendations.
2. Installation practices, including flange bolt torque, support spacing, and expansion considerations shall be in compliance with the manufacturer's recommendations.
3. Joints in underground and trench piping shall be made by fusion. Break-out joints in above ground piping shall be made w/flanges.
4. Installed piping shall be pressure tested before putting it into service in accordance with the manufacturer's recommendations.
5. TFE not suitable for radiation area use. In radiation areas ring material shall be selected for particular radiation fields and chemical compatibility.
6. When assembling nonmetallic flanges, flat washers shall be used under all bolt heads and nuts.
7. Original installation in FDP was ASTM 2146 (replaced by D4101) Type 1-29209 with thickness and tolerance per ASTM D-1785. However, these are not specific PP pipe standards. See ASME B31.3 Chapter VII "Nonmetallic Piping and Piping Lined with Nonmetals" and ICPP Materials Development Organization for further application and obtain prior written approval of ICPP Design Engineering Organization.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/2" - 6"	Polypropylene pipe, Schedule 80	Note 7
Fittings	All Sizes	Polypropylene Fittings, Socket Ends, Schedule 80	Note 7
Ball Valves	1/2" - 6"	Ball Valves, 150 psi, CWP, True Union, Polypropylene Body with TFE Seats, and TEE O-Ring Seal, Socket Ends with Socket Diameter compatible with Schedule 80 Polypropylene Pipe for Fusion Joining. Handle Operated.	See Note 5
Flanges		Polypropylene Flanges, Socket Ends, 150# FF ANSI B16.5.	ASTM D2146 Type 1-29209 ANSI B16.5 See Note 6
Gaskets		Hypalon <sup>R</sup> Gaskets for Polypropylene Flanges, Viton <sup>R</sup> Gaskets in Radiation Area, 150# FF ANSI B16.5 Drilling Full Face w/Bolt Holes, 1/8" Thick.	ANSI B16.5
Bolts		Hex Head machine Bolts w/Hex Head Nuts.	ASTM A307 Grade B See Note 6

## PIPING MATERIAL STANDARDS

### Copper Tubing (Refrigeration), Line Class NM

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Tube	2/8" - 6-1/8" O. D.	Seamless Refrigeration Tubing Hard Drawn, Straight Length.	ASTM B280 UNS #C12200
Fittings	3/8" - 6-1/8" O. D.	Wrought Copper Solder - Type Pressure Fittings.	ANSI B16.22
Soldering Material		Silver Brazing Wire.	
Gate Valves		125# Class, Bronze, Double Wedge, Rising Stem, Screwed Bonnet, Solder Joint Tubing End or SCRD.	ASTM B62
Globe Valves		150# Class, Bronze, Renewable Composition Disc, Rising Stem, Union Bonnet, Solder Joint Tubing End or SCRD.	ASTM B62
Check Valves		125# Class, Bronze, Screwed-In Cap, Bronze Disc, Solder Joint Tubing End or SCRD.	ASTM B62

## PIPING MATERIAL STANDARDS

### Carbon Steel, 150 psi Service Rating, Line Class NN

#### Design Notes

1. On all buried lines except firewater lines or raw water lines supplying fire mains, consideration should be given to welding all joints. See body of this standard for further direction.
2. Fittings and equipment in this line class for firewater lines or raw water lines supplying firewater mains shall be specified per NFPA-13 and Factory Mutual Data Sheet 2-8N for above ground piping and NFPA 24 and Factory Mutual Data Sheet 3-10 for underground piping in lieu of the fittings and equipment specified herein.
3. For high temperature service (250°).

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" and Smaller	Seamless Black Carbon Steel, SCH 40	ASTM A106 (3) Grade B
	All Sizes	Carbon Steel Schedule 40	ASTM A53
Fittings	2" & Smaller	150# Class, Malleable Iron, SCRD or 3000# Class, Forged Carbon Steel, SW or SCRD.	ASTM A197 or ASTM A105 See Note 3
	All Sizes	Seamless Wrought Carbon Steel BWE, Sch 40.	ASTM A234 Grade WPB
Gate Valves	2" & Smaller	800# Class, Forged Steel, SW or BW, OS&Y, BB, Trim for Steam Service, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A105 Note 3
	Larger than 2"	150# Class, Cast Steel, Flanged, OS&Y, BB, STD Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A216 Class B
	All Sizes	150# Class, Bronze, Cast Iron or Malleable Iron, SCRD, OS&Y, BB Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A126 Class B ASTM B61 ASTM B62
	Same as above	150# Class, Cast Steel, BW, OS&Y, BB Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A216
Globe Valves	2" & Smaller	800# Class, Forged Steel, SW or BW, OS&Y, BB, Trim for Steam Service, Renewable Disc & Seat Grafoil <sup>®</sup> Packing and Seat.	ASTM A105 Note 3
	All Sizes	150# Class, Bronze, Cast Iron or Malleable Iron, SCRD, OS&Y, BB, Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A126 Class B ASTM B61 ASTM B62
	Same as above	150# Class, Cast Steel, BW, OS&Y, BB, Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A216
	Larger than 2"	150# Class, Cast Steel, Flanged, OS&Y, BB, Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A216
Check Valves	2" & Smaller	800# Class, SW or BW, Piston or Lift Type Forged Steel, Trim for Steam Service, Grafoil <sup>®</sup> Gasket.	ASTM A105 Note 3
	3" & Larger	150# Class, Flanged, Cast Steel, Swing Type, Bolted Cap, Swing Type, Grafoil <sup>®</sup> Gasket.	ASTM A216
	All Sizes	150# Class, Bronze, Cast Iron or Malleable Iron SCRD, BB, Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A126 Class B ASTM B61 ASTM B62

## PIPING MATERIAL STANDARDS

### Carbon Steel, 150 psi Service Rating, Line Class NN

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
	Same as above	150# Class, Cast Steel, BW, BB, Standard Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A216
Ball Valves	2" & Smaller	300# Class, Cast Steel Body, SCRD, or SW 316 SST Ball & Stem, CS Packing Retainer and Gland, TFE Ball Seat, Grafoil <sup>®</sup> Seal Ring & Stem Packing.	ASTM A216
Butterfly Valves		150# Class, FF or Wafer-Type, Cast Iron, SST Shaft, Disc and Seat to be determined for particular service.	ASTM A126
Plug Valves	2" & Smaller	150# Class, Malleable Iron, Screwed, TFE Sleeve and Diaphragm.	ASTM A197
	3" & Larger	150# Class, Cast Steel, Flanged, TFE Sleeve and Diaphragm, Austenitic Stainless Steel Plug.	ASTM A216
	All Sizes	150# Class, Cast Steel, BW, TFE Sleeve and Diaphragm, Austenitic SST Plug.	ASTM A216
Diaphragm Valves	1/2" - 2"	125# Class, WOG, Screwed Ends, Cast Iron, Ethylene Propylene Diaphragm, Weir Type, Handwheel Operated Indicating Stem.	ASTM A126
	3" - 6"	125# Class, FF Flanged Ends, Cast Iron, Ethylene Propylene Diaphragm, Weir Type, Handwheel Operated Indicating Stem.	ASTM A126
Flanges	2" & Smaller	150# ANSI B16.5, RF, Forged CS Weld Neck, Slip-on, Threaded or SW.	ASTM A105 ASTM A181 ANSI B16.5
	3" & Larger	150# ANSI B16.5, RF, Forged CS Weld Neck, Threaded or Slip-on.	ASTM A105 ASTM A181 ANSI B16.5
Orifice Flanges	2" - 8"	Forged Carbon Steel, 300# Raised Face, bored to match pipe.	ASTM A105 ANSI B16.36
Gaskets	1/2" - 24"	150#, Grafoil <sup>®</sup> Gaskets, 1/16" Thick	ANSI B16.21
		Note: Use 300# Configuration with Orifice Flanges.	
Bolting		Chrome-moly, Stud bolt Threaded Full Length, Two Semi-Finished Heavy Hex Nuts Each	ASTM A193 Grade B7 ASTM A194 Grade 2H

## PIPING MATERIAL STANDARDS

### Polyvinyl Chloride - Drain, Waste and Vent (PVC-DWV) Uniform Plumbing Code PVC-DWV, Line Class NO

#### Design Notes

1. Although referenced in the UPC, some of the fittings shown in ASTM D3311 are not acceptable under the UPC. See UPC for more details.
2. Use PVC cement for solvent welding of SW fittings. (ASTM D2564)
3. Use UPC for connections or transitions to bell and spigot pipe fittings.
4. See the UPC for installation standards for PVC-DWV.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	2" - 4"	PVC-DWV, (SCH 40), Plain Ends for SW (Preferred) or SCRD.	ASTM D2665
Fittings	2" - 4"	PVC-DWV SW (Preferred or SCRD.	ASTM D2665 ASTM D3311 See Note 1 See Note 3

## PIPING MATERIAL STANDARDS

### Copper Tubing, Line Class NP

#### Design Notes

1. Note restrictions an use of tubing in Section 5.6.2 of the A-E Standard.
2. Where higher pressures are encountered, the designer has the option of selecting thicker-walled tubing.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Tube	1/8" - 1"	Copper, .035" Wall, Hard-drawn or soft-drawn Type K, Straight Length or Coil.	ASTM B88
Fittings	1/8" - 1"	Brass, Swagelok <sup>R</sup> Compression Type fittings	
Valves		Brass, Whitey <sup>R</sup> or Nupro <sup>R</sup> with Swagelok <sup>R</sup> Compression Type Fittings, TFE Seats and Seals.	

## PIPING MATERIAL STANDARDS

### Aluminum Tubing, Line Class NO

#### Design Notes

1. Note restrictions an use of tubing in Section 5.6.2 of the A-E Standard.
2. Where higher pressures are encountered, the designer has the option of selecting thicker-walled tubing.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Tube		Aluminum, Seamless, 0.035" Wall, Alloy 6061-T6.	Fed. WW-T-700/6 or ASTM B210
Fittings	1/8" - 1"	Aluminum, Swagelok <sup>R</sup> Compression Type Fittings.	
Valves		Aluminum, Whitey <sup>R</sup> or Nupro <sup>R</sup> with Swagelok <sup>R</sup> Compression Type Fittings, TFE Seats and Seals.	

## PIPING MATERIAL STANDARDS

### Ductile Iron Water Pipe, Line Class NR

#### Design Notes

1. Fittings and equipment in this line class for firewater lines or raw water lines supplying fire water mains shall be specified per NFPA-13 and Factory Mutual Data Sheet 2-8N for above ground piping and NFPA 24 and Factory Mutual Data Sheet 3-10 for underground piping in lieu of the fittings and equipment specified herein.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe		Ductile Iron with Rubber Gasketed Mechanical Push-On Seal Joints. Pipe shall be lined with cement-mortar and coated on the outside with coal tar (minimum 45 mils) or polyethylene (minimum thickness of 20 mils).	AWWA C151 AWWA C111 AWWA C104
Fittings		Ductile Iron, 150#, Joints to Match Pipe.	AWWA C110 AWWA C111
Hydrant Tee		Mechanical Joint with Rotating Gland, Run Size equal to Water Main Size, Branch Size 6" Nominal.	
Connecting Pieces		Hydrant Connecting Pieces, Mechanical Joint.	
Restrained Mechanical Joints		Ductile Iron Retainer Gland w/Square Head Set Screws.	UL Listed and Approved by Factory Mutual Engineering Division
Gate Valves		150# Class, Iron Body, OS&Y, Bolted Bonnet Bronze Mounted, Double Disc, Non-Rising Stem, Parallel Seat, Hub End, Flanged End, Mechanical Joint, or Mechanical and Flanged Joint as required.	ASTM A126 Class B
Check Valves		150# Class, Iron Body, Flanged Ends, Swing Type Bronze Faced Disc, Bolted Flanged Cap.	ASTM A126 Class B
Branches		Use Full or Reducing Tee, Cast Iron, Cement Lined, ends to match piping system.	



## PIPING MATERIAL STANDARDS

### Fiberglass Reinforced Plastic (FRP), Line Class NS

#### Design Notes

1. FRP type formulation and standard shall be determined for the particular service and associated corrosion and radiation requirements. Thermoplastic lined FRP shall be considered where corrosion is severe. See ASME B31.3 Chapter VII "Nonmetallic Piping and Piping Lined with Nonmetals" and ICPP Materials Development Organization for further direction on specifying material for the intended application and obtain prior written approval of ICPP Design Engineering Organization.
2. Valves for corrosion services shall be specified of materials suitable to withstand the particular corrosion service. 316 SST valves listed are for general use only.
3. TFE not for use in radiation areas.
4. When assembling nonmetallic flanges, flat washers shall be used under all bolt heads and nuts.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe		150# Rated Fiberglass Reinforced Plastic.	Note 1
Fittings		Bell & Spigot or Flanged, Compatible w/Manufacturer's System. Adapt to other systems w/Grooved, Threaded, or Flange Adapters.	
Gate Valves		150# Class, RF, OS&Y, Double Wedge, BB, 316 SST Body & Trim, Grafoil <sup>®</sup> Packing and Gaskets.	ASTM A351 Grade CF8M ASTM A182 Grade F316
Globe Valves		150# Class, RF, OS&Y, BB, 316 SST Body and Trim, Grafoil <sup>®</sup> Packing and Gasket	ASTM A351 Grade CF8M ASTM A182 Grade F316
Check Valves		150# Class, RF, Wafer Check 316 SST Body, Plates and Trim, Metal to Metal Seat, Inconel <sup>®</sup> Spring.	ASTM A351 Grade CF8M ASTM A182 Grade F316
Ball Valves		150# Class, RF, 316 SST Body, Ball & Stem, TFE Seats & Body Seals, SST External Parts, Lever Operated.	See Note 3 ASTM A351 Grade CF8M ASTM A182 Grade F316
Butterfly Valves		150# Class, Single Flange, Lug Type 316 SST Body & Disc, 17-4 pH Stem, Tefzel <sup>®</sup> Seal Ring, EPR Back-up Ring, Lever Lock Handle.	See Note 3 ASTM A351 Grade CF8M ASTM A182 Grade F316
Plug Valves		150# Class, RF, 316 SST Body, Cover and Plug, UHMW Polyethylene Sleeve and Diaphragm, Wrench Operated.	See Note 3 ASTM A351 Grade CF8M ASTM A182 Grade F316
Diaphragm Valves		150# Class, RF, 316 SST Body, Bonnet and Stem, Viton <sup>®</sup> Rubber Diaphragm, Weir Type, Handwheel Operated.	See Note 3 ASTM A351 Grade CF8M ASTM A182 Grade F316
Flanges		150# ANSI B16.5, FRP Flanges, when mating to raised face flanges or lug valves, use spacers to prevent damage to fiberglass flanges.	See Note 4 ANSI B16.5
Gaskets		Full Face, 1/8" Thick 60 Durometer. Torque as recommended by manufacturer of flange.	
Bolting		Stud Bolts 18-8 SST ASTM A193, Grade B8, Class 2 with Hex Nuts ASTM A194, Grade 8M	ASTM A193 Grade B8 Class 2 ASTM A194 Grade 8M See Note 4
Line Reduction		Use Concentric Flanged or Bell & Spigot Reducers.	
Branches		Full Size - Use Tee	

## PIPING MATERIAL STANDARDS

### Fiberglass Reinforced Plastic (FRP), Line Class NS

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
		Reducing - Use Saddle	

#### Design Notes

1. On the original NWCF specification SP-453504-50-3 cast iron was designated as class NE. All future installations throughout ICPP will be designated as class NT.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	4" - 12"	Cast Iron Soil Type, Bell and Spigot, Extra Heavy, Five or Ten Foot Lengths. (Nominal Sizes 4, 6, 8, 10 and 12.)	ASTM A74
Fittings	4" - 12"	Cast Iron Soil Type, Bell and Spigot, Extra Heavy.	ASTM A74
Clean Outs		Cast Iron Soil Type, with Cored Square Head Brass Plug, Bell and Spigot Ends, Extra Heavy.	ASTM A74
Joints		Bell and spigot joints shall be caulked with oakum and lead.	
Transitions to Existing VC		Cast iron soil pipe, spigot ends can be joined to the hubs of the same size vitrified clay.	

## PIPING MATERIAL STANDARDS

### Solid PVDF (Kynar)<sup>®</sup>, Line Class NU

#### Design Notes

1. PVDF piping system shall be fabricated in strict accordance with the manufacturers recommendations and approved ICCP PVDF fusion-weld procedures.
2. Installation practices including flange bolt torque, support spacing and pipe expansion considerations shall be in compliance with the manufacturers recommendations.
3. Installed piping shall be hydrostatically tested before putting it into service in accordance with the manufacturers recommendations.
4. When assembling nonmetallic flanges, flat washers shall be used under all bolt heads and nuts.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1/2" - 2"	PVDF Pipe for Socket-Welding as manufactured by Resistoflex (Fluoroflex-K) <sup>®</sup> or equal. Sch 80.	
	1/2" - 3"	PVDF Pipe for Butt-Welding as manufactured by ASAHI/America (Superproline) <sup>®</sup> , 230 psi Pressure Rating for Water at 73.4°F.	
	4" - 8"	PVDF Pipe for Butt-Welding as manufactured by ASAHI/America (Superproline) <sup>®</sup> , 160 psi Pressure Rating for Water at 73.4°F.	
Fittings	1/2" - 2"	PVDF Fittings for Socket-Welding as manufactured by Resistoflex <sup>®</sup> or equal. Sch 80.	
	1/2" - 3"	PVDF Fittings for Butt-Welding as manufactured by ASAHI/America (Superproline) <sup>®</sup> , 230 psi Pressure Rating for Water at 73.4°F.	
	4" - 8"	PVDF Fittings for Butt-Welding as manufactured by ASAHI/America (Superproline) <sup>®</sup> , 160 psi Pressure Rating for Water at 73.4°F.	
Flanges	1/2" - 2"	PVDF Flanges, Socket-Weld, 150# FF ANSI B16.5 Dimensions as manufactured by Resistoflex <sup>®</sup> with SST Back-up Washers.	ANSI B16.5
	1/2" - 3"	PVDF Stub End Butt-Weld with SST Back-up Ring as manufactured by ASAHI/America (Superproline) <sup>®</sup> , 230 psi Pressure Rating for Water at 73.4°F with SST Back-up Washers.	
	4" - 8"	PVDF Stub-End Butt-Weld with SST Back-up Ring as manufactured by ASAHI/America (Superproline) <sup>®</sup> , 160 psi Pressure Rating for Water at 73.4°F with SST Back-up Washers.	
Gaskets		Viton A <sup>®</sup> Gaskets for 150# PVDF Flange, 1/8" Thick, 60 Durometer.	
		TFE Envelope Gasket for 150# PVDF Flange.	
Bolts		Use 304 SST Bolts ASTM A193 Gr B8 and Galling	See Note 4 ASTM A193 Gr B8

## PIPING MATERIAL STANDARDS

### Solid PVDF (Kynar)<sup>®</sup>, Line Class NU

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
		Resistant Nitronic 60 <sup>®</sup> Nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A194 Gr 8S UNS S21800
Gate Valves	1-1/2" - 8"	Solid PVDF, 150# Class FF Flanged, Non-Rising Stem, Seal material to be specified for particular corrosion and radiation service.	
Check Valves	3/4" - 8"	Solid PVDF, 150# Class FF Flanged, Horizontal Swing, Seat and Seal Material to be specified for particular corrosion and radiation service.	
Ball Valves	1/2" - 6"	Solid PVDF, 150# Class FF Flanged, True-Union Type, Seat and Seal Material to be specified for particular corrosion and radiation service.	
	1/2" - 2"	Solid PVDF, 150# Socket-Weld, True-Union, Seat and Seal Material to be specified for particular service.	

## PIPING MATERIAL STANDARDS

### Carbon Steel - PVDF (Kynar)<sup>R</sup> Lined, 150 psi Service Rating, Line Class NV

#### Design Notes

1. Manufacturer's suggested bolt torque shall be used in assembling flange joints.
2. All in-cell carbon steel and forged steel piping shall be protected from decontaminant piping corrosion by epoxy coating all exposed external surfaces.
3. No gaskets are normally required between flanges with molded raised faces. Before disconnecting flanges, scribe match marks in flange sides to ensure exact line-up when reconnected.
4. The following pressure limitations shall be followed for diaphragm valves at 100°F.

	<u>Max.</u>
<u>Size</u>	<u>Pressure</u>
1" - 4"	150 psig
6" only	125 psig

5. Companion flanges are used for molded raised face and gasketed pipe joints with PVDF liner.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1" - 5"	Carbon Steel, Schedule 40, Lined with PVDF 150# ANSI B16.5 Cast Steel Flange Ends.	ASTM A587 ANSI B16.5
Fittings	1" - 6"	Cast Steel Flanged Fittings, 150# ANSI B16.5, Lined with PVDF, Molded Raised Face.	ANSI B16.5 ASTM A216 Grade WCB
Diaphragm Valves		150# Class Molded Raised Face PVDF Lined Cast Carbon Steel, Hand Wheel Operated with TFE Diaphragms (Outside Cell Only.) Diaphragm Material shall be specified for the particular service when in-cell.	See Note 4 ANSI B16.5 ASTM A216 Grade WCB
Check Valve	1" - 6"	150# Class Molded Raised Face Cast Steel, PVDF Lined, Diaphragm material shall be specified for the particular service when in-cell.	ASTM A216 Grade WCB ANSI B16.5
Flanges Companion	1" - 6"	150# ANSI B16.5, Forged Steel or Ductile Iron, Screwed, Chamfered.	See Note 6 ASTM A105 ASTM A395 ANSI B16.5
Flanges (Blind)	1" - 6"	150# ANSI B16.5, Forged Steel or Ductile Iron Blind Flanges, (use with PVDF Full Face Blind Spacer).	ASTM A105 ASTM A395 ANSI B16.5
Reducing Flanges (Filler)		PVDF Lined 150# ANSI B16.5, Forged Steel or Ductile Iron.	ASTM A105 ASTM A395 ANSI B16.5
Flanges		Solid PVDF 2" Thickness with Stainless Steel Back-up Washers.	
Gaskets		Viton A <sup>R</sup> , 1/16" Thickness 60 Durometer	
Bolting		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Grade B8 ASTM A194 Grade 8S UNS S21800
Branches	1" - 6"	Use Full or Reducing PVDF Lined Flanged Fittings.	
Spacers		Use Standard Full-Face or Reducing Full-Face PVDF Spacer of 1/2" Minimum Thickness when Mating PVDF Lined Piping Items with all other type of Flanged Piping.	

## PIPING MATERIAL STANDARDS

### Carbon Steel - PVDF (Kynar)<sup>R</sup> Lined, 150 psi Service Rating, Line Class NV

#### Design Notes

1. Manufacturer's suggested bolt torque shall be used in assembling flange joints.
2. All in-cell carbon steel and forged steel piping shall be protected from decontaminant piping corrosion by epoxy coating all exposed external surfaces.
3. No gaskets are normally required between flanges with molded raised faces. Before disconnecting flanges, scribe match marks in flange sides to ensure exact line-up when reconnected.
4. The following pressure limitations shall be followed for diaphragm valves at 100°F.

<u>Size</u>	<u>Max. Pressure</u>
1" - 4"	150 psig
6" only	125 psig

5. Companion flanges are used for molded raised face and gasketed pipe joints with PVDF liner.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1" - 5"	Carbon Steel, Schedule 40, Lined with PVDF 150# ANSI B16.5 Cast Steel Flange Ends.	ASTM A587 ANSI B16.5
Fittings	1" - 6"	Cast Steel Flanged Fittings, 150# ANSI B16.5, Lined with PVDF, Molded Raised Face.	ANSI B16.5 ASTM A216 Grade WCB
Diaphragm Valves		150# Class Molded Raised Face PVDF Lined Cast Carbon Steel, Hand Wheel Operated with TFE Diaphragms (Outside Cell Only.) Diaphragm Material shall be specified for the particular service when in-cell.	See Note 4 ANSI B16.5 ASTM A216 Grade WCB
Check Valve	1" - 6"	150# Class Molded Raised Face Cast Steel, PVDF Lined, Diaphragm material shall be specified for the particular service when in-cell.	ASTM A216 Grade WCB ANSI B16.5
Flanges Companion	1" - 6"	150# ANSI B16.5, Forged Steel or Ductile Iron, Screwed, Chamfered.	See Note 6 ASTM A105 ASTM A395 ANSI B16.5
Flanges (Blind)	1" - 6"	150# ANSI B16.5, Forged Steel or Ductile Iron Blind Flanges, (use with PVDF Full Face Blind Spacer).	ASTM A105 ASTM A395 ANSI B16.5
Reducing Flanges (Filler)		PVDF Lined 150# ANSI B16.5, Forged Steel or Ductile Iron.	ASTM A105 ASTM A395 ANSI B16.5
Flanges		Solid PVDF 2" Thickness with Stainless Steel Back-up Washers.	
Gaskets		Viton A <sup>R</sup> , 1/16" Thickness 60 Durometer	
Bolting		Use 304 SST Bolts ASTM A193 Gr B8 and Galling Resistant Nitronic 60 <sup>R</sup> Nuts ASTM A194 Gr 8S (UNS S21800).	ASTM A193 Grade B8 ASTM A194 Grade 8S UNS S21800
Branches	1" - 6"	Use Full or Reducing PVDF Lined Flanged Fittings.	
Spacers		Use Standard Full-Face or Reducing Full-Face PVDF Spacer of 1/2" Minimum Thickness when Mating PVDF Lined Piping Items with all other type of Flanged Piping.	

## PIPING MATERIAL STANDARDS

### Asbestos - Cement Per AWWA C400, Line Class NX

#### Design Notes

1. This specification describes existing piping only. On future installations this material specification shall be prohibited.

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe		Asbestos - cement for water and other.	C400 AWWA
Fittings		Fitting shall be mechanical joint or taper fittings consistent with the manufacturer's recommendation for the piping used.	
Valves		Refer to piping manufacturers recommendation.	
Flanges		Same as above.	
Gaskets		Same as above.	
Bolting		Same as above.	

## PIPING MATERIAL STANDARDS

### Acrylonitrile - Butadiene - Styrene (ABS) Plastic Drain, Waste and Vent Line Class NY

#### Design Notes

1. Use ABS solvent cement for joining pipe and fittings made to this specification. (ASTM D2235)

TYPE	PIPE SIZE	MATERIAL DESCRIPTION	CODE
Pipe	1-1/4" - 4"	Acrylonitrile - Butadiene - Styrene (ABS) Plastic Drain, Waste, and Vent Pipe or ABS Sch 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core.	ASTM D2661 ASTM F628
Fittings		ABS Plastic DWV Fittings SCRD or Solvent Weld ABS SCH 40 Plastic DWV Fittings with a Cellular Core, SCRD or Solvent Weld.	ASTM D2661 ASTM F628



## **Appendix N**

### **Sample Welding Process Applications Matrix**

## Sample Welding Process Applications Matrix

Processes/ Procedures Applications	Metal Arc Pulsed (GMAW-P) S6.2	Metal Arc Short Arc (GMAW-S) S6.1	Tungsten Arc (GTAW) S2.0	Arc (FCAW) Carbon Steel Only	Shielded Metal Arc (SMAW) S3.4	Submerged Arc (SAW)	Gas Metal Arc (GMAW) Spray Transfer S6.3	Plasma Arc (PAW)	Remarks
Piping and Components	1		1, 2	1	1, 2		1		1. Shop Weld Only, >8" IPS 2. Shop Weld <8" IPS and Field Weld.
Ductwork	X		X		X				
Vessels and Tanks	X		X	X	X	X	X	X	
Fill Lines	1		1, 2	1	1, 2		1		1. Shop Weld Only, >8" IPS 2. Shop Weld <8" IPS and Field Weld.
Drain Lines	1		1, 2	1	1, 2		1		1. Shop Weld Only, >8" IPS 2. Shop Weld <8" IPS and Field Weld.
Vented Headers (Atmospheric Pressure)	1		1, 2	1	1, 2		1		1. Shop Weld Only, >8" IPS 2. Shop Weld <8" IPS and Field Weld.

## **Appendix O**

### **Sample Examination and Inspection Applications Matrix**

## Sample Examination and Inspection Applications Matrix

Nondestructive Tests and Examinations Applications	Visual Inspection (VT)	Radiography (RT)	Ultrasonic Testing (UT)	Magnetic Particle Testing (MT)	Liquid Penetrant Testing (PT)	Eddy Current Testing (ET)	Acoustic Emission Testing (AET)	Leak Testing (LT)	Remarks
Piping and Components	X	X			1			2	1. PT Final Passes 2. Pneumatic Test
Ductwork	X				1				1. PT Final Pass
Vessels and Tanks	X	X	X		X			X	See Specifications for details.
Fill Lines	X				1				
Drain Lines	X				1				
Vented Headers (Atmospheric Pressure)	X				1				

## **Section J**

### **Attachment J-H**

# **REUSABLE PROPERTY, RECYCLABLE MATERIALS, AND WASTE ACCEPTANCE CRITERIA**

DOE/ID-10381  
March 1999



U.S. Department of Energy  
Idaho Operations Office

# **Idaho National Engineering and Environmental Laboratory Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC)**

**Information Only Copy**



**Idaho National Engineering and  
Environmental Laboratory Reusable  
Property, Recyclable Materials, and  
Waste Acceptance Criteria (RRWAC)**

**DOE/ID-10381**

**Idaho National Engineering and Environmental  
Laboratory Reusable Property, Recyclable Materials,  
and Waste Acceptance Criteria (RRWAC)**

**March 1999**

**Prepared for the  
U.S. Department of Energy  
Idaho Operations Office**



INEEL-RRWAC Idaho National Engineering and Environmental Laboratory, Reusable Property,  
Recyclable Materials, and Waste Acceptance Criteria

## REVISION LOG

Revision Number	Date Approved	Pages Affected	Description of Revision
0	10/27/93 DOE-ID Letter OPE/WMPO-93-46		Initial Issue, Phase I, of INEL-WAC, DOE-ID 10381 included only acceptance criteria for mixed waste.
1	02/25/94 DOE-ID Letter OPE/WMPO-94-45	All	Change name to INEL-RRWAC -includes acceptance criteria for all applicable INEL Facilities.
2	05/31/94 DOE-ID Letter OPE/WMPO-94-46	4.4-8, 4.6-12	Prohibit acceptance of hazardous waste until WERF WAC is issued. See DRR-ER&WM-RS-1416
3	02/08/95 DOE-ID Letter OPE/WMPO-95-46	All	General upgrade and addition of Key Word Index. See DRR-1594 at LITCO Document Control.
4	08/24/95 DOE-ID approved on DRR-2202 as requested in JVV-122-95	pp. iii thru vii and pp. 4.6-3 thru 4.6-8	Added limit for arsenic to acceptance criteria for MLLW to be incinerated at WERF in Table 4.6.2-2 on pg.4.6-7. See DRR-2202 at LITCO Document Control.
5	10/10/95 DOE-ID approved on DRR 2264 as requested in JVV-132-95	All	General upgrade, and addition of acceptance criteria for several LITCO treatment and storage facilities. See DRR-2264 at LITCO Document Control.
6	02/10/96 DOE-ID approved on DAR-3523 as requested in MJW-04-97 DOE-ID Letter OPE/WMPO-97-029	All	Incorporation of RWMC and WERF/WROC SAR and permit revision requirements and a general upgrade.
7	01/27/98 DOE-ID approved on DAR-5067 as requested in MJW-145-97 DOE-ID Letter OPE/WM-98-011		

Revision Number	Date Approved	Pages Affected	Description of Revision
8	10/07/98 DOE-ID approval on DARs 15426 and 16036 <del>03/29/99</del>	viii, 4.5-2, 4.5-18, 4.5-19	(1) Added definition of PCB bulk product waste, (2) revised the glue requirement for INEEL Wooden Waste Package Closure, and (3) incorporated the change in 40 CFR 761 revising limits pertaining to PCB disposal.
9	<del>10/24/99</del> DOE-ID approval on DAR 16728		Incorporation of Waste Generator Services. General upgrades including corrections to criterion relating to IWTS use, transportation, waste receipt, compliance to RCRA Permits, and the removal of unnecessary criterion and redundancy.

## ABSTRACT

This Idaho National Engineering and Environmental Laboratory Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC) document is intended to provide a user-friendly path to follow for transferring any personal property (including recyclable materials and waste) owned by the Department of Energy (DOE) from an organization which no longer needs the property to an organization which can properly disposition the property.

The RRWAC promulgates specific DOE Idaho Operations Office acceptance criteria to assure that this transfer of property is in compliance with all applicable DOE, Environmental Protection Agency, Nuclear Regulatory Commission, Department of Transportation, and State of Idaho requirements.

The process herein defined follows a two-point philosophy:

Wherever possible, property no longer required by one organization is made available to others such that waste is minimized.

Waste that does not have a means of disposition that meets all applicable regulatory requirements should not be generated.

In following this philosophy, the RRWAC requires first consideration always to be given to reuse of property in its original form, then to recycling of any pieces of the property, and finally to separation of the waste material such that it can be treated, stored, and disposed in the most effective and efficient manner.

Chapters 1, 2, and 3 provide introductory, administrative, and characterization instructions for the transfer. Chapter 4 provides specific acceptance criteria which must be met before shipping each specific classification of property from the generator (originator) to the organization which can accept it or approve its transfer to an offsite facility.



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## ACRONYMS<sup>a</sup>

ANL-W	Argonne National Laboratory-West
ASA	Auditable Safety Analysis
BMP	Best Management Practice
BTU	British thermal unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
D&D	decontamination and decommissioning
DEQ	Division of Environmental Quality
DOE	Department of Energy
DOE-ID	DOE Idaho Operations Office
DOT	Department of Transportation
DQO	Data Quality Objective
EDF	Engineering Design File
ER&WM	Environmental Restoration and Waste Management Department
EPA	Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HCRWSF	Hazardous Chemical and Radioactive Waste Storage Facility (CPP-1619)
HFEF	Hot Fuel Examination Facility (Argonne 785)
HFLS	HEPA Filter Leaching System (at NWCF, CPP-659)
HLLWE	High-Level Liquid Waste Evaporator (at NWCF, CPP-659)
HLW	high-level waste
HWSF	Hazardous Waste Storage Facility (CF-637)

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<sup>a</sup> When an acronym refers to a building, the building number is listed in parentheses.

IDAPA	Idaho Administrative Procedures Act
IES	INEEL Environmental System
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IWTS	INEEL Waste Tracking System
LDR	land disposal restrictions
LET&D	Liquid Effluent Treatment and Disposal (CPP-1618)
LF	Lead Facility (PER-612)
LMITCO	Lockheed Martin Idaho Technologies Company
LLW	low-level waste
LSA	low specific activity
MCC	Multicurie Cell (CPP-627)
MLLW	mixed low-level waste
MSDS	material safety data sheet
MTRU	mixed transuranic waste
MWSF	Mixed Waste Storage Facility (PER-615)
NRC	Nuclear Regulatory Commission
NRF	Naval Reactor Facility
NWCF	New Waste Calcining Facility (CPP-659)
PAR	Property Action Report
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCB	polychlorinated biphenyl
PCM	petroleum contaminated material
PECOS	Plant and Equipment Control System
PEWE	Process Equipment Waste Evaporator (CPP-604)
POHC	principal organic hazardous constituents

PP/WMP	pollution prevention/waste minimization plan
PROPID	property identification number
PSU	Portable Storage Unit (PER-615 - MWSF)
PWTU	Portable Water Treatment Unit
RADCON	Radiological Control
RAL	Remote Analytical Laboratory (CPP-684)
RCRA	Resource Conservation and Recovery Act
RMWSF	Radioactive Mixed Waste Staging Facility (CPP-1617)
RRWAC	Reusable Property, Recyclable Materials, and Waste Acceptance Criteria
RSM	radioactive scrap metal
RWMC	Radioactive Waste Management Complex
SAP	Sampling and Analysis Plan
SAR	Safety Analysis Report
SCW	Special Case Waste
SMO	Sample Management Office
SSU	Standard Saybold Units
TAN	Test Area North
TCLP	toxicity characteristic leaching procedure
TFF	Tank Farm Facility (CPP-602)
TID	tamper indicating device
TPH	total petroleum hydrocarbons
TRA	Test Reactor Area
TRAMPAC	TRUPACT-II authorized methods for payload control
TRU	transuranic
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility

VOC	volatile organic compounds
WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan
WCP	Waste Certification Program
WERF	Waste Experimental Reduction Facility (PER-609)
WIPP	Waste Isolation Pilot Plant
WMCT	Waste Management Compliance Team
WROC	Waste Reduction Operations Complex
WWSB	WERF Waste Storage Building (PER-623)

## DEFINITIONS

**NOTE:** *References for each definition are included in parenthesis after the definition. Where the definition is unique to this document, Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC) is the reference note in parenthesis. The intent is to provide a definition consistent with other Department of Energy (DOE) documents; therefore, users of the RRWAC are encouraged to recommend definitions and their associated references where these definitions will be improved and more consistent as a result.*

**Best Management Practice**—A criterion established to enhance operational effectiveness when no criterion is specified by regulatory or other related documents. As the RRWAC is upgraded, the basis for each BMP will be included as feasible.

**Example:** Acceptance criteria in Subsection 4.5.1.12g. requires some contact-handled, low-level waste containers to be labeled with maximum radiation levels at contact and at 1 meter in air. Following this best management practice assists the receiving facility in minimizing personnel radiation exposure (RRWAC).

**Certified Waste**—Material that has been confirmed to comply with applicable acceptance criteria under an approved certification program (DOE Order 5820.2A).

**Characterization**—A process of determining, documenting, and knowing all pertinent constituents, with their physical, radiological, and chemical characteristics, that are introduced into or derived from a process that generates waste and/or recyclable materials (DOE Order 5820.2A). Includes assignment of the Resource Conservation and Recovery Act (RCRA) source code(s), when applicable [40 Code of Federal Regulations (CFR) 261].

**Conditional Waste**—A special category of waste as specified in Subsection 4.3.2 of the RRWAC.

**Etiologic Agent**—A viable microorganism, or its toxin, which causes or may cause human disease, and is limited to those agents listed in 42 CFR 72.3 of the regulations of the Department of Health and Human Services (49 CFR 173.196).

**Excess Personal Property**—Personal property under control of a federal agency that is not required for that agency's needs and the discharge of its responsibilities (41 CFR 101-43.001-6).

**Exchange**—To replace a non-excess personal property item by trade-in with the supplier of the replacement item when the value of it is used to reduce the cost of the acquired item (41 CFR 101-46.001-3).

**Fissionable Material**—Nuclides capable of sustaining a neutron-induced, fission chain reaction. Fissionable radionuclides are plutonium-238, plutonium-239, plutonium-241, uranium-233, uranium-235, neptunium-237, americium-241, and curium-244 (DOE Order 5480.5).

**Flammable Liquid (for Waste Experimental Reduction Facility only)**— Any liquid having a flashpoint below 100°F (37.8°C), except any mixture in which 99% or more of the total volume consists of components with flashpoints of 100°F (37.8°C) or higher (adapted from 29 CFR 1900.106).

**Definitions  
(continued)**

*Free Liquid*—Liquids that readily separate from the solid portion of a waste under ambient temperature and pressure (DOE Order 5820.2A); as demonstrated by "EPA Paint Filter Liquids Test Methods 9095" as appropriate (RRWAC).

*Friable Asbestos*—Asbestos-containing products other than those which are nonfriable (40 CFR 61.141).

*Generator*—Any organization, by site (e.g., location, building), whose act or process produces reusable property, recyclable material, or waste; or any Treatment, Storage, and Disposal Facility (TSDF) that ships waste to another TSDF (RRWAC).

*Hazardous Waste*—Those solid wastes (see definition of solid waste) that are designated hazardous by Environmental Protection Agency (EPA) regulations (40 CFR 261.3, and DOE Order 5820.2A, Attachment 2).

*High-Level Waste*—The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid, that contains a combination of transuranic (TRU) waste and fission products in concentrations requiring permanent isolation (DOE Order 5820.2A, Attachment 2).

*Ignitable*—As defined in 49 CFR 173, or it is an oxidizer as defined in 49 CFR 173.127 (40 CFR 261) and the characteristic of ignitability as defined in 40 CFR 261.21.

*Immobilized Materials*—Materials fixed in a matrix such as glass, ceramic, cement, or concrete (RRWAC).

*Incinerable Waste*—Waste that qualifies for incineration as a treatment under the receiving facility waste acceptance criteria (RRWAC).

*Incompatible Waste*—A waste that is unsuitable for (a) placement in a particular device or facility because it may cause corrosion of containment materials (e.g., container inner liners or tank walls) or (b) commingling with another waste or material under uncontrolled conditions because the commingling might produce heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases; for examples, see 40 CFR 265, Appendix V (40 CFR 260.10).

*Industrial Waste*—Solid waste generated by industrial processes, manufacturing, and support processes (40 CFR 243). At the INEEL, industrial waste to be disposed of at the INEEL Landfill Complex does not include hazardous waste or land disposal restricted waste regulated under Subtitle C of RCRA (RRWAC).

*Low-Level Waste*—Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or byproduct material by DOE Order 5820.2A. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of transuranic isotopes are less than or equal to 100 nCi/g (DOE Order 5820.2A).

*Mixed Waste*—Waste which meets the RRWAC definitions for either hazardous waste or Toxic Substances Control Act (TSCA) waste, and radioactive waste (RRWAC). Mixed waste is referred to in the RRWAC as either mixed low-level waste or mixed TRU waste.



**Definitions  
(continued)**

*Nonfriable asbestos*—Consists of asbestos-containing materials that have the asbestos fibers immersed or fixed in a matrix material that prevents the asbestos fibers from being released upon handling and that have not been subjected to cutting, abrading, sanding, grinding, or any other operation that could cause asbestos fiber to become readily releasable from the host matrix material on handling [RRWAC, adapted from 40 CFR 61.141 and 49 CFR 173.216(b)]. Examples of such materials that may meet this definition are asbestos containing packing, gaskets, resilient floor covering, asphalt roofing products, or bricks.

*Nonstandard Material or Waste Package*—Material or packaging that does not meet one or more requirements as set forth in the RRWAC.

*Overpack*—An additional container enclosing a package (RRWAC). For radioactive waste an additional container enclosing a waste package (DOE Order 5820.2A). When offered for transportation, refer to 49 CFR 173.25.

*Package*—The contained material and its container (e.g., box, drum, insert), including any liners, shielding, absorbents, and cushioning. Transport devices and shielded shipping devices are not to be construed as part of the package (49 CFR 171.8 and 49 CFR 173.403).

*Packaging*—A receptacle and any other components or material necessary for the receptacle to perform its containment function in conformance with the minimum packaging requirements of 49 CFR. For radioactive materials, it may consist of one or more receptacles, absorbent materials spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The conveyance tie-down system and auxiliary equipment may sometimes be designated as part of the packaging (49 CFR 173.8403 and 173).

*PCB bulk product waste*—Waste derived from manufactured products containing PCBs in a non-liquid state, at any concentrations where the concentration at the time of designation for disposal was greater than or equal to 50 ppm PCBs. This does not include debris from the demolition of buildings or other man-made structures that has been contaminated by PCB spills.

*Personal Property*—Property of any kind or type which is government owned, rented, or leased from commercial sources in the custody of DOE or its contractors, except real property; records; special source materials; special nuclear materials; etc. (41 CFR 109-1.5003).

*Pressurized container*—Containers pressurized, or having the potential to become pressurized, to greater than 7 psig [DOE Order 5820.2A, Chapter III.e(5)(f)].

*Pyrophoric Material*—A pyrophoric material is a liquid or solid that, even in small quantities and without an external ignition source, can ignite within five (5) minutes after coming in contact with air when tested according to paragraph 3.a.(1) or 3.a.(2), as appropriate, of Subpart E to 49 CFR 173 [49 CFR 173.124(b)(1)].

*RCRA Permit*—For the purposes of this document, the term “RCRA Permit” refers to final RCRA Part B permits, RCRA Part B permits and applications, RCRA interim status operating permits, or RCRA Part A permits.

*Radioactive Waste*—A waste managed for its radioactive content, which is not otherwise regulated for that radioactive content (e.g., regulated by Clean Air Act, Clean Water Act). If a material is received as nonradioactive, any resulting waste is not a radioactive waste if it meets the following conditions:

**Definitions  
(continued)**

Contains no measurable increase in radioactivity (at a statistically defined confidence interval) above background in volume or bulk resulting from DOE Operations except for wastes specifically exempted by EPA, DOE, or Nuclear Regulatory Commission regulations (e.g., 10 CFR 20.2005)

Contains no radioactivity above limits established in the *INEEL Radiological Control Manual*, LMITCO Manual 15A or DOE/EH-0256T, Table 2-2.

*Receiving Facility*—The Idaho National Engineering and Environmental Laboratory (INEEL) or offsite facility that physically receives the property, material, or waste (RRWAC).

*Receiving Organization*—The appropriate INEEL organization that coordinates and approves the disposition of property, material, and waste to a receiving facility (RRWAC).

*Recyclable Material*—At the INEEL, a material that can no longer serve the purpose for which it was produced without processing, if such material can be used or reused for another purpose, or reclaimed for use (RRWAC). A material is used or reused if, subject to regulatory limitations, it is either

Employed as an ingredient (including use as an intermediate) in an industrial process to make a product; however, a material will not satisfy this condition if distinct components of the material are recovered as separate end products (as when metals are recovered from metal-containing secondary materials); or

Employed in particular function or application as an effective substitute for a commercial product [adapted from 40 CFR 261.1(c)].

*Residue Material*—The minimal amount of material remaining after the balance has been removed through such processes as evaporation, draining, combustion, distillation, or filtration (RRWAC).

*Scrap Metal*—Metal which can be reused or recycled (RRWAC).

*Shipping Paper*—As described in 49 CFR 171.8.

*Solid Waste*—For the purpose of industrial waste definition only, see 40 CFR 258.2. For the purpose of hazardous waste definition, see definition of solid waste in 40 CFR 261.2.

*Special Case Waste*—DOE waste of any characterization, with no identified path to disposal (RRWAC).

*Spent Nuclear Fuel*—Fuel that has been withdrawn from a nuclear reactor following irradiation but that has not been reprocessed to remove its constituent elements (DOE Order 5820.2A).

*Standard Container*—A container that meets receiving facility requirements (RRWAC).

*Storage Unit*—A discrete part of the storage facility (RRWAC).

*TSCA Waste*—Waste which is managed strictly under TSCA regulations. Presently only Polychlorinated Biphenyls (PCBs), Asbestos, and Dibenzo-Para-Dioxins/Dibenzofurans, are regulated under TSCA as waste.

*Transport Device*—A reusable shipping device, not necessarily a waste package (i.e., cargo container) (RRWAC).

**Definitions  
(continued)**

*Transuranium Radionuclide*—Any radionuclide having an atomic number greater than 92 (DOE Order 5820.2A).

*Transuranic Waste*—Without regard to source or form, waste that is contaminated with alpha-emitting, transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay. Heads of Operations Offices (e.g., DOE-ID) may determine if other alpha-contaminated wastes, peculiar to a specific site, must be managed as TRU waste (DOE Order 5820.2A). At the INEEL, wastes containing radium-226 and uranium-233 are included as TRU wastes (RRWAC).

*Unrestricted Release*—A release of property or material, based on a formal, documented decision, reflecting risk-based standards, licensing considerations, and associated implementing procedures, so that the property can be utilized, treated, or disposed of by any party without concern for radioactive content (RRWAC).

*Waste Container*—A receptacle for waste, including any liner or shielding material that is intended to accompany the waste in disposal (DOE Order 5820.2A).

*Waste Minimization*—The reduction, to the extent feasible, of waste that is generated or subsequently treated, stored, or disposed of. It includes any source reduction or recycling activity resulting in either (1) reducing the total volume or quantity of waste; or (2) reducing toxicity of hazardous waste, or both, so long as present and future threats to human health and environment are minimized (EPA/625/7-88/003).

*Waste Package*—The waste, waste container, and any absorbent that are intended for disposal as a unit. In the case of surface contaminated, damaged, leaking, or breached waste packages, any overpack shall be considered the waste container, and the original container shall be considered part of the waste (DOE Order 5820.2A).

*Waste Stream*—Waste material from comparable generation processes, possessing similar physical, chemical and radiological characteristics, that will be managed by the same TSD methods.

# **Idaho National Engineering and Environmental Laboratory Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC)**

## **1. INTRODUCTION**

The purpose and the policy for the Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC) are discussed in this section. These criteria are binding on all entities authorized to use the facilities listed in this document for receiving reusable property, recyclable materials, or waste to be treated, stored, or disposed. These entities are also responsible for promulgating the RRWAC requirements to their subcontractors.

The ten basic interrelated material types addressed by these acceptance criteria are listed below:

1. Reusable personal property
2. Recyclable materials
3. Industrial waste
4. Hazardous waste
5. Low-level waste
6. Mixed low-level waste
7. Fluid with radioactive/hazardous contamination
8. Transuranic waste
9. Mixed transuranic waste
10. High-level waste.

It is the responsibility of the generator to properly identify and segregate these material types and to meet the requirements of the appropriate acceptance criteria. To assist the generators in compliance with this document, LMITCO provides assistance through the Waste Generator Services (WGS) organization. Implementation of WGS is intended to streamline material and waste acceptance processes and to provide material and waste generators with turnkey management services through a single accountable organization. The prime objective of WGS is to maximize efficiency and eliminate material and waste management noncompliance conditions at the INEEL. Each generating organization or facility, as appropriate will be assigned a WGS representative. This service incorporates the Waste Management Board, replacing all references thereto. Consult Table 1-1 for the list of representatives, and subject mater experts from the Idaho National Engineering and Environmental Laboratory (INEEL) available to help the generator in the proper selection of and compliance to acceptance criteria for INEEL and non-INEEL facilities.

Figure 1-1 presents a flow path to assist generators in ensuring that government personal property, other material, or waste can be properly dispositioned. This path leads the user to the appropriate location in this document where acceptance criteria are presented for facilities listed in this document. That process follows the two-point philosophy of management listed below:

1. Wherever possible, property and other materials no longer needed by one organization are made available to others such that waste is minimized.

**Introduction  
(continued)**

**Table 1-1. RRWAC information sources.**

Service	Name	Mail Stop	Phone	E-mail
Reusable Personnel Property RRWAC Section 4.1	<i>HOT LINE</i>		208-526-4500	
Recyclable Materials RRWAC Section 4.2	Randy Romine	5231	208-526-3271 <i>6-9690</i>	<a href="mailto:zrz@inel.gov">zrz@inel.gov</a>
Mixed Low-Level and Hazardous Waste RRWAC Sections 4.6 & 4.4	Phil Gray, Section Supervisor	4142	208-526-7934	<a href="mailto:pbg@inel.gov">pbg@inel.gov</a>
Low-Level Waste and Industrial Waste RRWAC Sections 4.5 & 4.3	Roger Piscitella, Section Supervisor	4142	208-526-1137	<a href="mailto:rrp@inel.gov">rrp@inel.gov</a>
Technical Support (Data Base Management)	Brian Seggerty, Section Supervisor	2604	208-526-4253	<a href="mailto:bks2@inel.gov">bks2@inel.gov</a>
RRWAC Information	Dale Wells, Revision & Interpretation	4142	208-526-7711	<a href="mailto:jdww@inel.gov">jdww@inel.gov</a>
Transuranic Waste RRWAC Sections 4.8 & 4.9	<del>Kelly Galloway</del>	4210	208-526-0902	<del><a href="mailto:kg3@inel.gov">kg3@inel.gov</a></del>
High Level Waste RRWAC Section 4.10	Dennis Chinich	5111	208-526-3648	<a href="mailto:dc6@inel.gov">dc6@inel.gov</a>
Pollution Prevention	David Janke	4110	208-526-6327	<a href="mailto:jankedh@inel.gov">jankedh@inel.gov</a>

2. Waste that does not have a means of disposition that meets all applicable regulatory requirements should not be generated.

In following this philosophy, the RRWAC requires first consideration always to be given to reuse of property in its original form, then to recycling of any pieces of the property, and finally to separation of the waste material such that it can be treated, stored, and disposed in the most effective and efficient manner.

## 1.1 Purpose

The purpose of this INEEL-RRWAC is to define the Department of Energy Idaho Operations Office (DOE-ID) requirements for characterizing, packaging, and documenting reusable property, recyclable materials, and waste to be received by INEEL or off-site facilities. Off-site designated facilities may have additional acceptance requirements not addressed in the RRWAC. Such requirements will be identified by Waste Generator Services on a case-by-case basis.

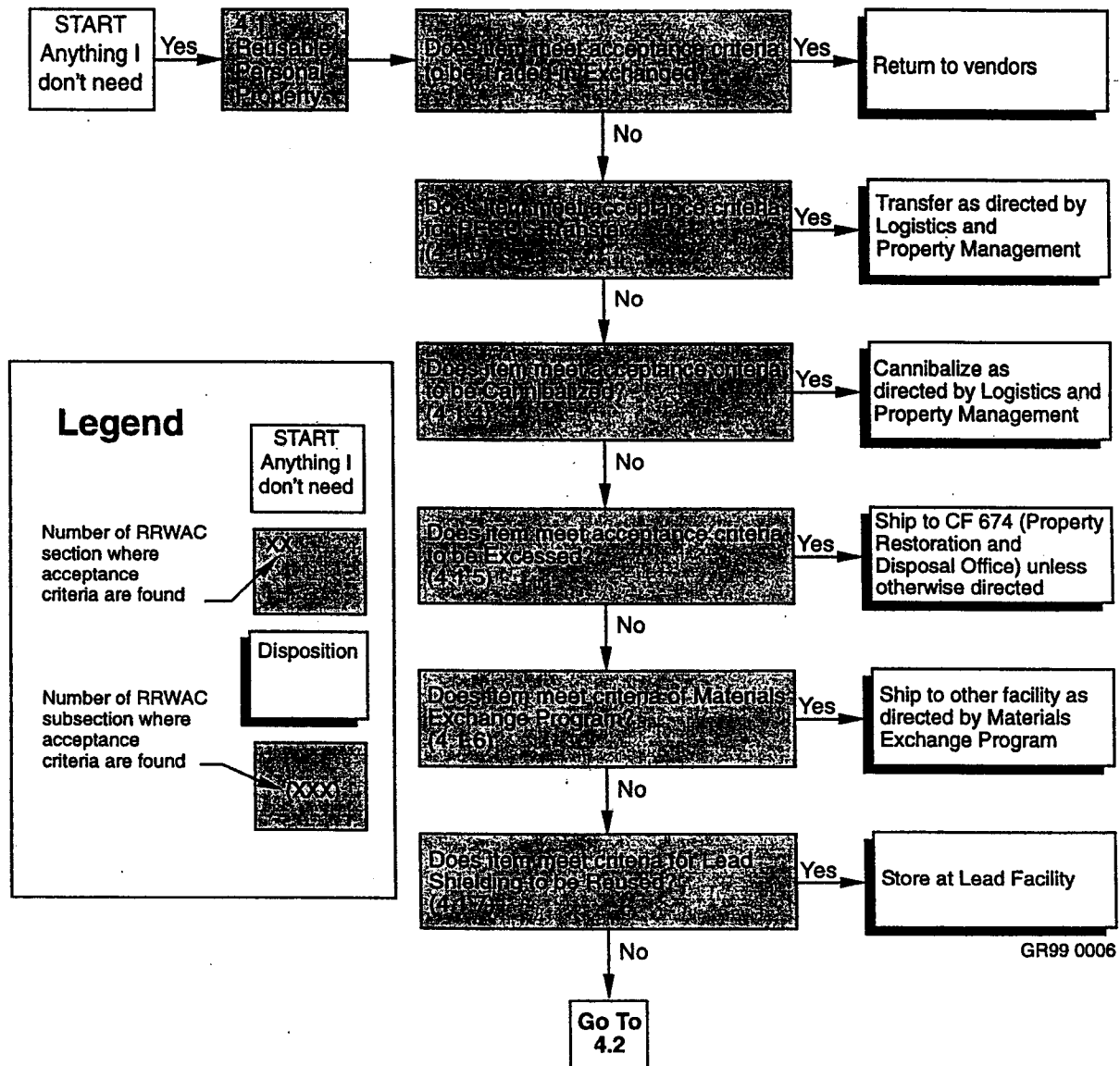


Figure 1-1. Decision Tree for Anything I Don't Need.

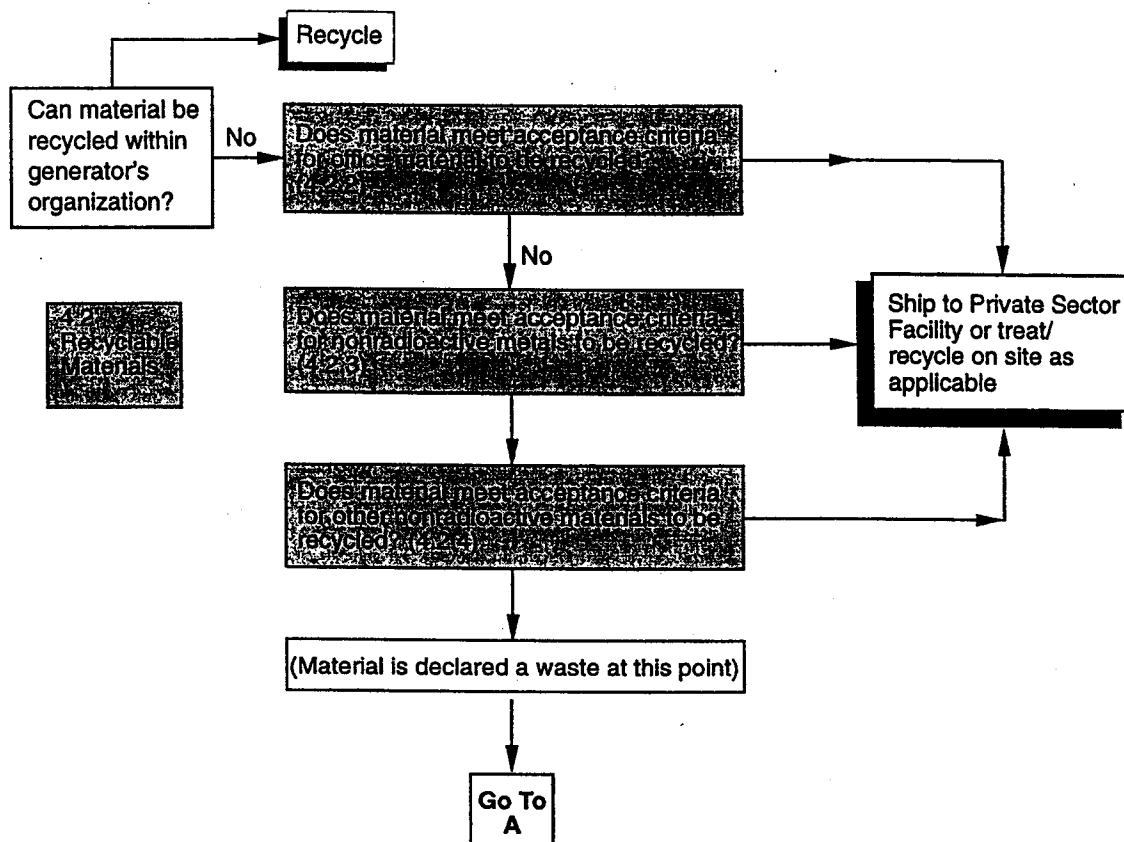
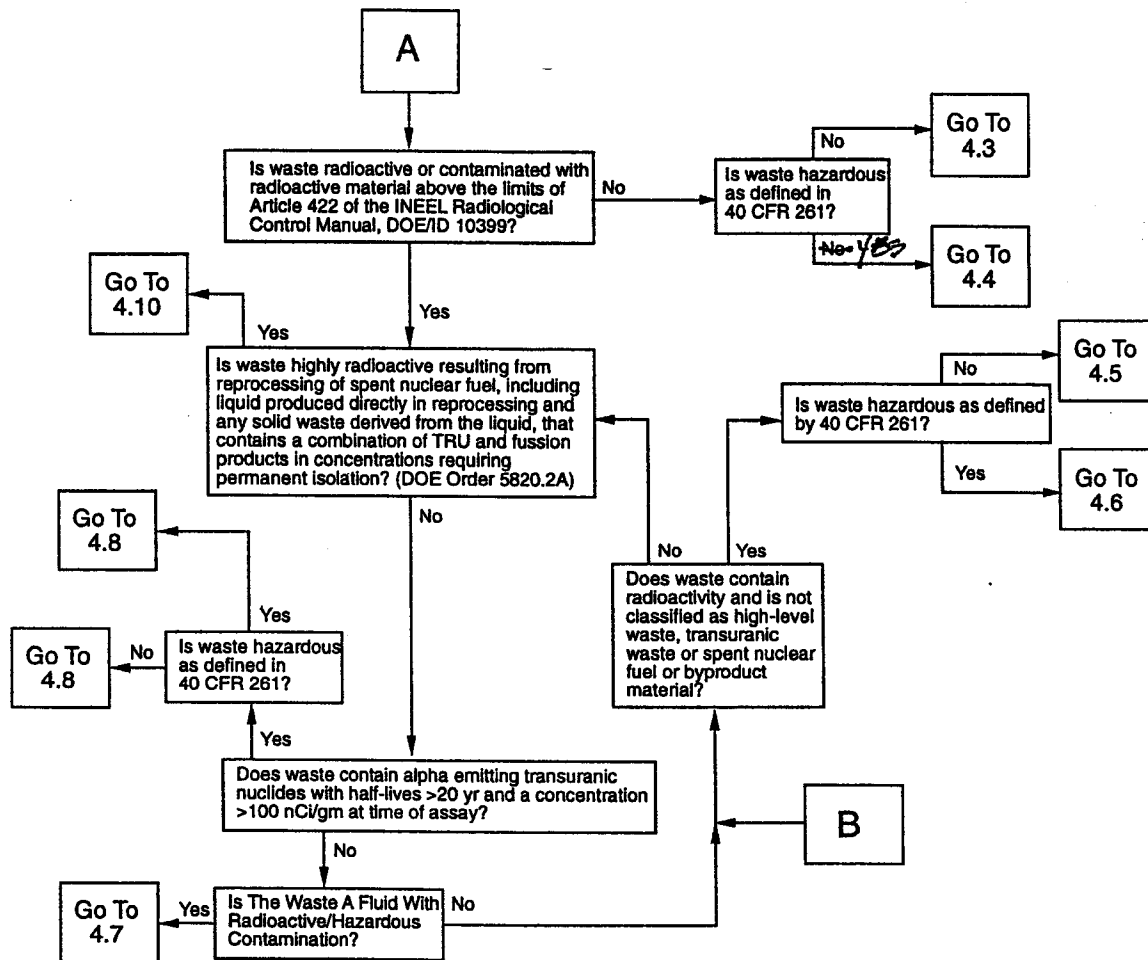


Fig. 1-1.2

Figure 1.1 (Continued)

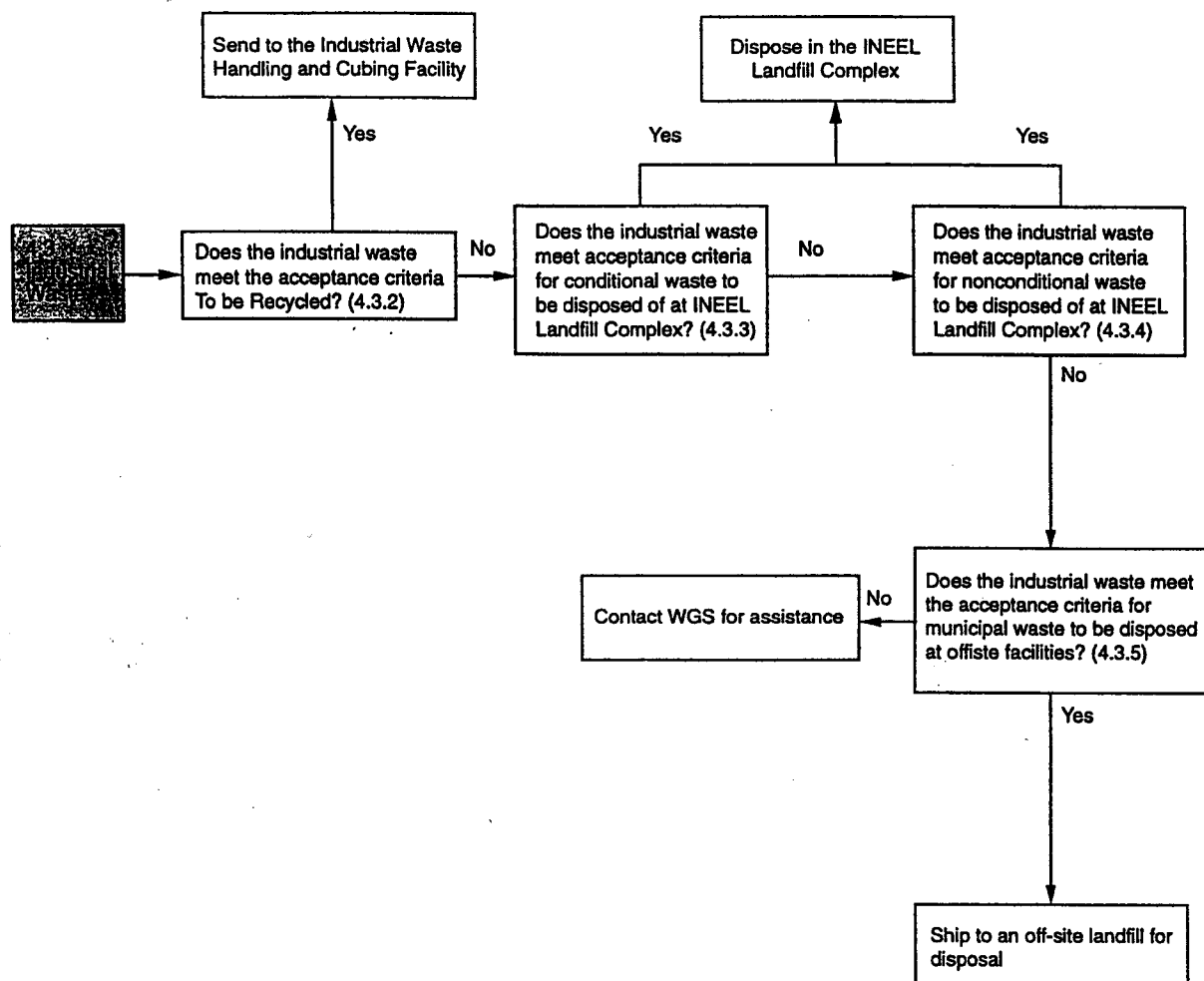


GV980568c

**Fig. 1-1.3**

**Figure 1.1 (Continued)**

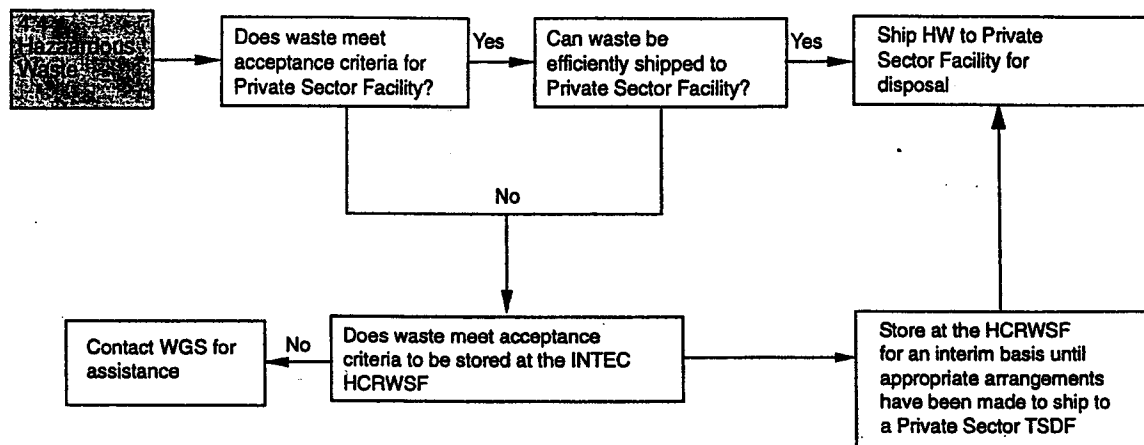




GV980568d

Fig. 1-1.4

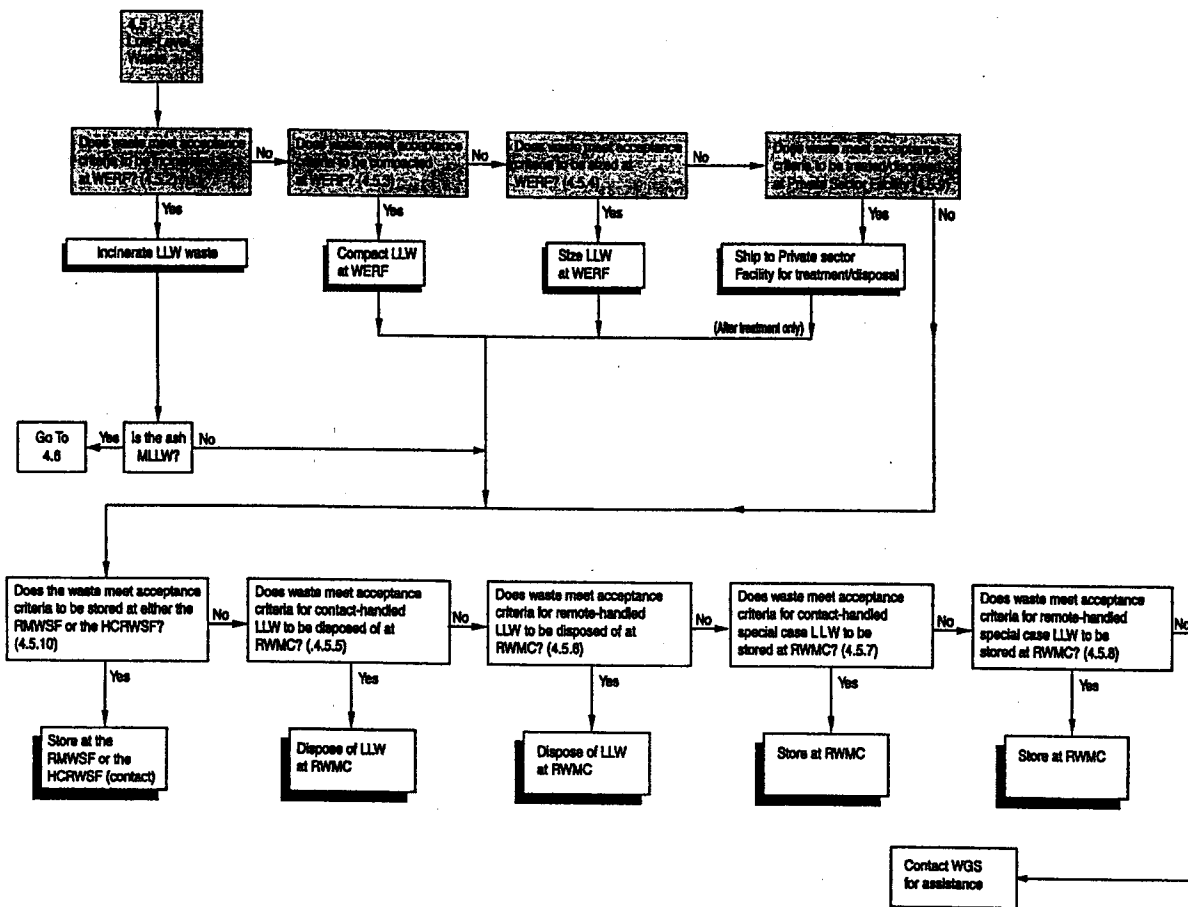
Figure 1.1 (Continued)



GV980568e

Fig. 1-1.5

Figure 1.1 (Continued)



GV980568f

Fig. 1-1.6

Figure 1.1 (Continued)

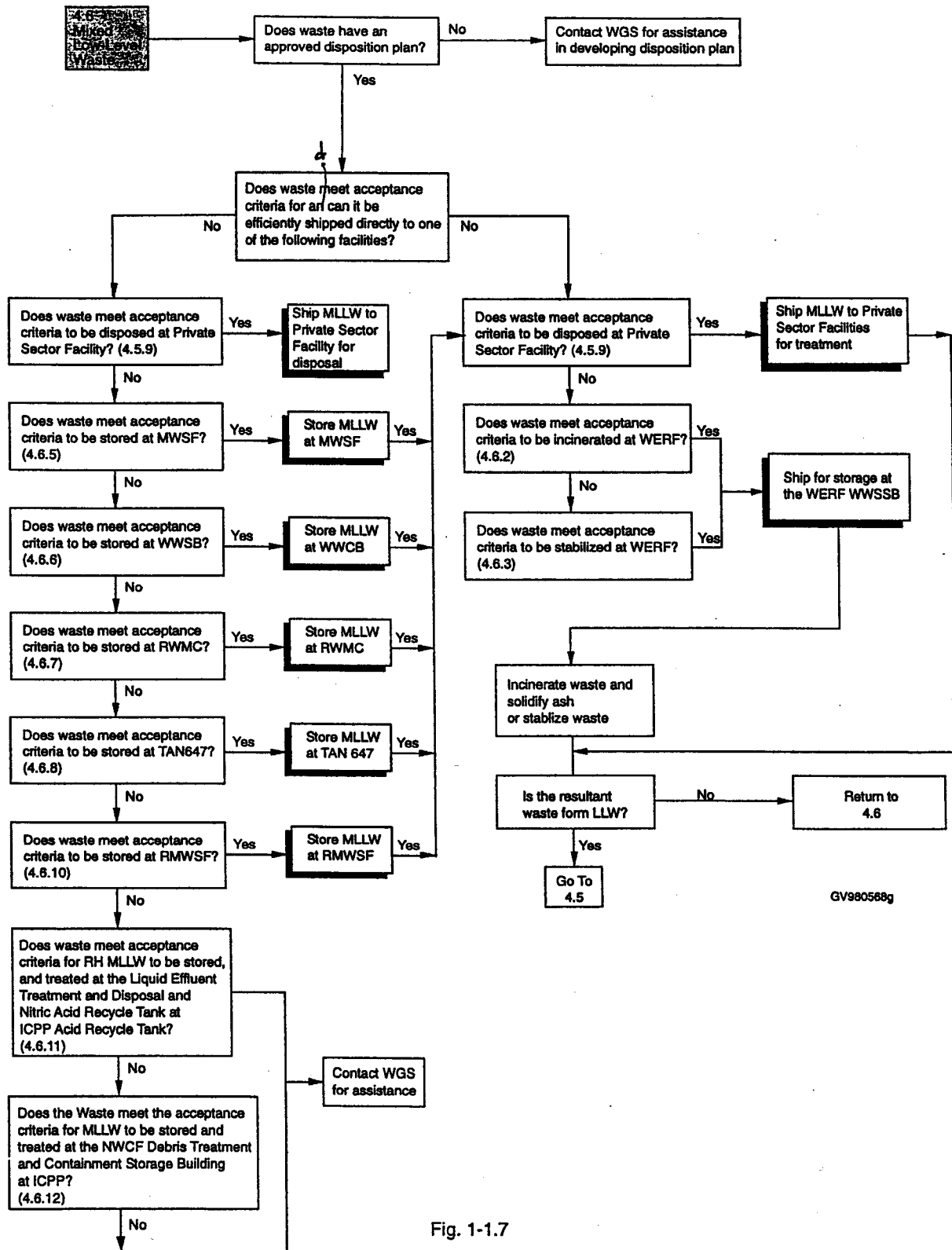
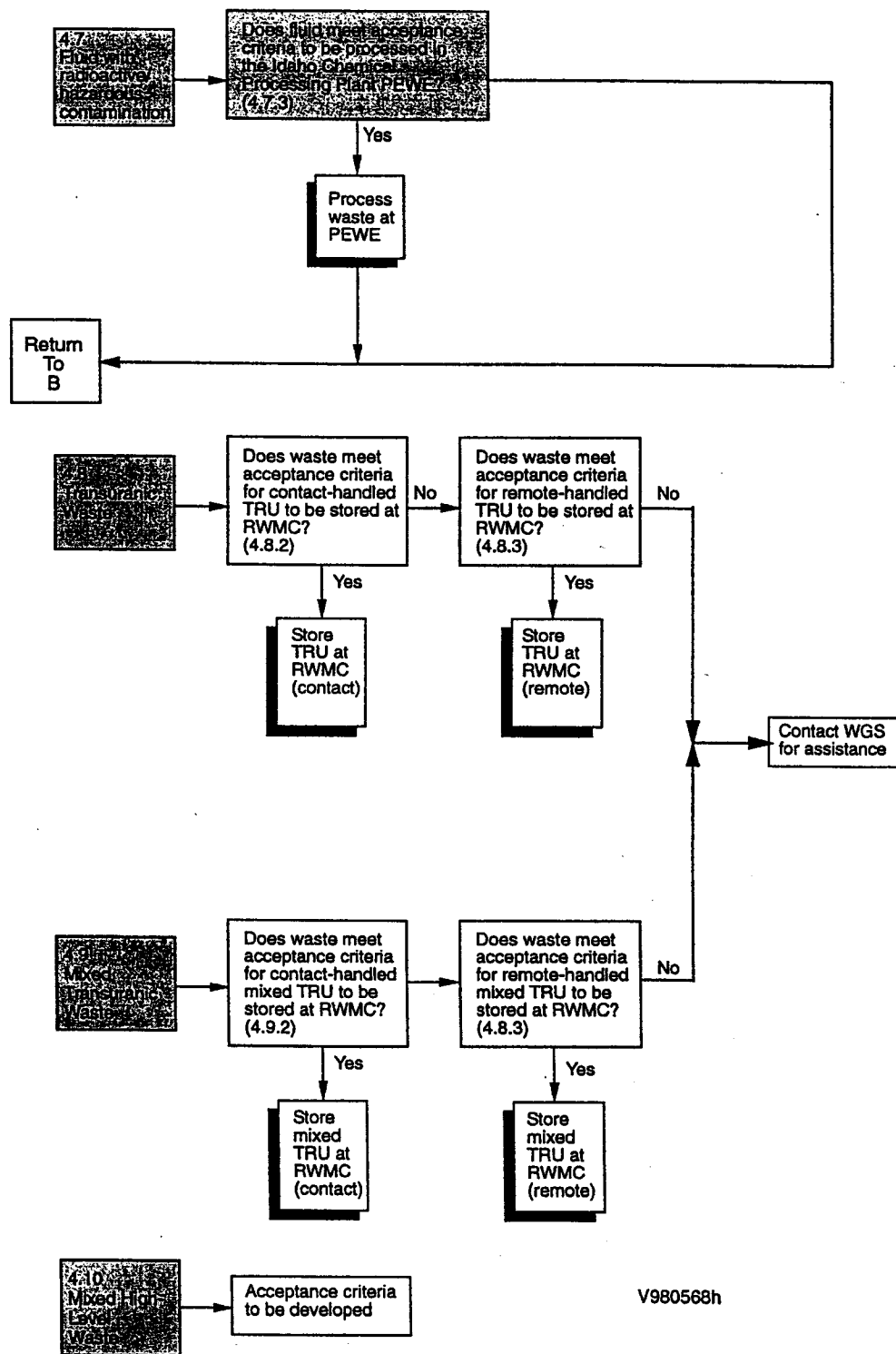


Fig. 1-1.7

Figure 1.1 (Continued)



V980568h

Fig. 1-1.8

Figure 1.1 (Continued)

**Introduction  
(continued)**

## **1.2 Policy**

The policy of DOE-ID is to ensure compliance with the following:

1. The first priority of DOE and the primary responsibility of the generator is to prevent the generation of waste and minimize the volume and hazard of such material at the source. The systematic approach established by the RRWAC promotes an efficient use of INEEL facilities for reusable property, recyclable materials, and waste.
2. Reusable property, recyclable materials, and waste are managed on a systematic basis, satisfying the requirements of applicable DOE Orders and Federal and State regulations.
3. All operations are managed in a manner that protects the health and safety of the public and workers, and preserves the environment of the INEEL.
4. Special authorization must be obtained before shipping any materials or packages that do not meet the criteria stated herein. The basis for each acceptance criterion in Chapter 4 is listed in parentheses after the criterion.
  - a. If the basis is best management practice (BMP), the appropriate manager of the receiving organization may choose to exempt the material or packaging from meeting the acceptance criterion on a case-by-case basis, after proper evaluation. In such case the material or packaging is classified as "Nonstandard." The request for the nonstandard material or package and the approval from the receiving organization for the material or package shall be documented including any special conditions.
  - b. If the basis is anything other than BMP, WGS shall submit an exemption request to the intended receiving organization for evaluation. If, after evaluation, the receiving organization confirms that the request cannot be met within regulatory requirements, WGS will forward the request and its recommendation to DOE-ID for review, applicable consultation with the regulatory authority, and appropriate action.
5. Requests from non-INEEL generators to offer recyclable materials and waste to appropriate INEEL receiving facilities will be considered by DOE-ID. Before DOE-ID will accept material from a non-INEEL generator, the cognizant manager of the generating organization must submit a written request to the DOE-ID manager. When DOE-ID agrees to accept the material, DOE-ID will document this agreement. An audit of non-INEEL generators may be conducted by DOE-ID before agreeing to accept the material.
6. Recyclable materials and waste, other than office waste, will not be received by DOE-ID receiving facilities from INEEL generators that do not have an auditable pollution prevention/waste minimization program in effect. This program must be documented by a current pollution prevention/waste minimization plan on file with the LMITCO Pollution Prevention organization.
7. As established in Executive Order 12344, the Naval Nuclear Propulsion Program is exempt from the provisions of DOE Order 5820.2A. The Director of the Naval Nuclear Propulsion Program maintains environmental protection programs to establish compliance with applicable environmental statutes and regulations (DOE Order 5820.2A).
8. The responsibility for approving this document rests with DOE-ID. The management coordination of this document and resolution of all questions and comments to the

**Introduction  
(continued)**

satisfaction of DOE-ID is the responsibility of LMITCO. Revisions to this RRWAC, as approved, will be issued.

### 1.3 Applicability

The applicability of the various sections and subsections of the RRWAC depends upon the type of item requiring dispositioning as indicated in Figure 1-2.

Item	Chapter 1	Chapter 2	Chapter 3	Chapter 4
Reusable property (other than materials to be exchanged)	All	None	None	Only the subsection appropriate for: 1. Item 2. Destination.
Materials to be exchanged	All	2.1 (2.1.1 - 2.1.4 only) 2.2 (all)	None	Only the subsection appropriate for: 1. Item 2. Destination.
Recyclable materials	All	2.1 (2.1.1 - 2.1.5 only) 2.2 (all)	All - except not applicable for recyclable office waste	Only the subsection appropriate for: 1. Item 2. Destination.
Non-radioactive waste	All	2.1 (2.1.1 - 2.1.5 only) 2.2 (all) 2.3 (all)	All - except not applicable for nonconditional sanitary waste	Only the subsection appropriate for: 1. Item 2. Destination.
Radioactive waste	All	All	All	Only the subsection appropriate for: 1. Item 2. Destination.

**Figure 1-2.** Applicability of the RRWAC.

### 1.4 Configuration Management

This document is maintained under strict configuration control in order to ensure that users are provided with the correct acceptance requirements. Controlled copies of this document are in electronic format only. Access at the INEEL is through URL <http://titanic/dmcs/rrwac.pdf>, all other access is through URL <http://titanic.inel.gov/rrwac/regrrwac.html>. Uncontrolled copies may be printed for one time "Information Only" use; however, they will be so labeled and are not to be used for official guidance in the management of any reusable property, recyclable materials, or waste.

Approval by DOE-ID is required for any changes to this document. Since this document is a compilation of acceptance criteria from several facilities, revisions to specific acceptance criteria sections may be made without opening the entire document to review.

Anyone may request a change to the INEEL RRWAC by submitting a change request (preferably on INEEL form 412.11#, DMS Document Action Request, or equivalent to the LMITCO Waste Generator Services, MS 4142.

## 2. ADMINISTRATIVE CRITERIA

**NOTE:** *Chapter 2 does not apply to reusable property with the exception of materials to be exchanged.*

To offer materials to be exchanged, recyclable materials, or waste to an Idaho National Engineering and Environmental Laboratory (INEEL) or other designated receiving facility, generators shall comply with the applicable requirements of this document. WGS will verify compliance by audits or inspections of documentation and operations. Verification of the material or waste form may not be necessary when supporting data can be successfully verified.

Should a generator exhibit lack of compliance and the issues cannot be readily resolved, WGS may recommend suspension of the generator's authorization to generate, package and transport materials to be exchanged, recyclable materials, or waste. Suspension will be documented in writing and remain in effect until issues have been resolved and compliance has been reestablished.

### 2.1 WGS and Generator Responsibilities

Generator and receiving organizations through WGS are jointly responsible for ensuring compliance to the INEEL Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC). Generators are responsible to contact WGS prior to the time waste generation is anticipated to ensure all requirements for pollution prevention, characterization, packaging, and receipt will be identified and met.

The generator shall have budgetary responsibility for costs such as those necessary to package and deliver material to the receiving facility. Included in these costs, for example, are development of waste certification programs, characterization activities, container procurement, transport plans, shipping charges, and discrepancy resolution.

Generators and WGS shall ensure that the material form, package, and documentation adhere to these criteria. Data utilized for documenting material or waste characterization shall be routinely verified through appropriate methods, recognizing and documenting data limitations. Legally and scientifically defensible data should be obtained, whenever possible. A portion of all data, historical or current should be verified prior to use for characterization purposes. Entry of this data into the INEEL Integrated Waste Tracking System (IWTS) accurately is mandatory. Entered data shall be verified and as approved is authorized for internal and external reporting purposes.

Material that is known to be or has a potential to be regulated by the Resource Conservation and Recovery Act (RCRA) or the Toxic Substances Control Act (TSCA) requires special planning. Generators at the INEEL should notify WGS within 30 days of moving this material or waste into temporary storage if there is a possibility the material or waste will be eventually shipped from the temporary storage to a LMITCO facility or to an offsite treatment, storage, or disposal facility (TSDF).

When verification testing of hazardous or mixed waste is performed at the generator's facility, the generator is responsible for management and disposition of secondary waste generated by this verification.



## **2.1 WGS and Generator Responsibilities (continued)**

### **2.1.1 Packaging**

Packaging of chemicals to be exchanged, recyclable materials, and waste shall be in compliance with this document. Use of nonstandard waste packages shall be minimized by the use of technology, design, and existing INEEL waste management capabilities. Packaging requirements detailed in the RRWAC are those of special interest to the receiving organizations and are not all inclusive. All requirements stipulated in other documents such as Department of Transportation (DOT) regulations are applicable and those documents should be consulted for detailed packaging and shipping requirements.

Nonstandard material forms or packaging shall be considered by the receiving organization on a case-by-case basis. Whenever materials or packaging do not meet the standard criteria as detailed in this document, WGS shall submit a formal request for acceptance of nonstandard material or packaging. This request shall be submitted to the receiving organization manager in writing. Approval for a nonstandard material form or packaging may be provided after all data requirements are fulfilled, but under no circumstance should the material be shipped to the receiving facility until the generator has received such approval.

1. Requests for approval of nonstandard material forms and packaging are the responsibility of the generator. Generator responsibilities include costs related to design, development, and testing activities.
2. Requests for nonstandard packaging and material forms shall, as a minimum, address the following:
  - a. Recyclable material or waste characterization including a completed IWTS Material and Waste Characterization Profile or WGS approved equivalent
  - b. Description and justification of nonstandard features
  - c. Nonstandard packaging design, as applicable
  - d. Compatibility analysis for chemical characteristics and packaging for nonstandard material form
  - e. Container operating procedure, as applicable
  - f. Special handling equipment or requirements
  - g. Rigging design and proof of load test, as applicable
  - h. Transportation system, as applicable
  - i. Transport plan, as applicable.

### **2.1.2 Transportation**

The generator, WGS and transporter shall be responsible for complying with pertinent Department of Energy Idaho Operations Office (DOE-ID), Department of Transportation, Environmental Protection

## 2.1 WGS and Generator Responsibilities (continued)

Agency, Nuclear Regulatory Commission, and State regulations. For the purpose of operational requirements at the INEEL receiving facilities, containers shall not be stacked more than one container high on open transport vehicles. Incinerable burn boxes shall be stacked no more than four high in a cargo container. They shall also ensure that requirements for transport, and the requirements contained in any applicable transport plan or certificate of compliance, are adhered to before shipping from the generator's facility.

Scheduling of shipments from non-INEEL generators shall be coordinated with LMITCO Packaging and Transportation Department and the shipper's traffic department. At least two weeks in advance of a pre-approved shipment to an INEEL facility, the non-INEEL generator should notify the INEEL receiving organization of the expected arrival day of the shipment.

Generators at the INEEL shall coordinate all onsite shipments through WGS.

### 2.1.3 Discrepancy Resolution

Waste Generator Services is responsible for resolving characterization, documentation, packaging, shipping, and other discrepancies excluding costs incurred, which are the generators responsibility.

### 2.1.4 Quality Assurance

All activities associated with the criteria stipulated in the RRWAC shall be controlled and conducted according to the applicable requirements of DOE Order 5700.6, "Quality Assurance," and NQA-1 in a graded approach commensurate with the degree of hazard. Radioactive waste certification programs shall also be controlled and conducted in accordance with DOE Order 5700.6. Quality assurance requirements of the applicable RCRA Waste Analysis Plan will be met for waste to be received by RCRA regulated facilities.

### 2.1.5 Pollution Prevention/Waste Minimization Plan

*Facilities routinely generating*  
**NOTE:** Subsection 2.1.5 applies only to ~~generation of~~ recyclable materials and waste other than office waste.

A Pollution Prevention/Waste Minimization Plan (PP/WMP) addresses how source reduction, recycling, and other measures are used to reduce the gross volume of wastes and pollutants.

Prevention supersedes remediation. Guidance for PP/WMP development and appropriate goals are presented in U.S. Department of Energy Idaho Operations Office (DOE-ID) Waste Minimization and Pollution Prevention/Awareness Plan (SEN 37). In this guidance document, current INEEL waste reduction goals for all waste types are specified to be 10% reduction annually through calendar year 1999, 33% reduction of 17 priority chemicals by 1997, and 50% reduction of all toxic chemicals by 1999.

Generators at the INEEL, other than the Naval Nuclear Propulsion Program, are responsible for maintaining an auditable waste minimization program. Recyclable materials or waste will not be received by INEEL receiving organizations from INEEL generators that do not have an auditable waste minimization ~~program~~ <sup>Plan</sup>. This ~~program~~ <sup>Plan</sup> must be documented by a PP/WMP on file with the LMITCO Pollution Prevention organization.

## 2.1 WGS and Generator Responsibilities (continued)

### 2.1.6 Waste Certification Program for Radioactive Waste

**NOTE:** *Subsection 2.1.6 applies only to generators of radioactive waste and radioactive recyclable materials.*

Each generator of radioactive waste and radioactive recyclable materials shall have a waste certification program (WCP) to provide assurance that appropriate sections of the acceptance criteria and applicable RCRA waste analysis requirements are met (DOE Order 5820.2A for low-level waste).

Annually, as a minimum, the WCP of each generator shall be self-assessed, updated, and submitted to WGS for approval. Waste Generator Services shall concur in writing with the generator's WCP before approving the first shipment under this RRWAC and each WCP thereafter, but not less than annually.

Waste Generator Services is a waste certification program method of managing waste with radioactive constituents. Waste generating organizations that fully implement Waste Generator Services are in compliance with this Waste Certification Program requirement.

Documentation of the required elements of the certification program, including records and operations pertaining to generation, shall be available for audit in the generator's facility by an independent audit team.

The WCP describes the methods a generator employs to ensure material and waste are properly controlled and characterization, packaging, and documentation are accurate. Data required by and entered in to the Integrated Waste Tracking System (IWTS) documenting waste streams and packaged waste shall be verified prior to approval of the characterization and container profiles. The WCP shall invoke the applicable RRWAC requirements for the generator. Documentation of the program shall include the structure of the generator's material and waste management organization and identify the authority and responsibility for each key position associated with the material and waste management process. Technical and administrative control documents required by the generating organization to manage the materials and waste in compliance with this RRWAC shall be listed in the WCP documentation.

The following basic elements shall be addressed in the WCP. If a particular element is not relevant to the program, a brief explanation should be included as documentation for that element. Relevant procedures and documents for each element must be maintained in auditable form.

1. Facility name and location
2. Contractor name and contacts
3. Facility recyclable material and waste management strategy
4. Organization
5. Duties and responsibilities of key positions
6. Training and qualification of personnel, and qualification of procedures and equipment involved in the WCP

## 2.1 WGS and Generator Responsibilities (continued)

7. Recyclable material and waste segregation control
8. Waste characterization control
  - a. Process knowledge control (including control of standard laboratory protocols)
    - (1) Radioactive isotope identification and quantification
    - (2) Chemical constituent identification and quantification.
  - b. Control of sampling and analysis accomplished by adherence to Environmental Protection Agency (EPA), "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods," SW-846 (1986) and other EPA or oversight regulatory agency recognized approved methods for hazardous constituent analysis or DOE or INEEL Sample Management Office approved methods for radiological analysis
  - c. Data accuracy.
9. Packaging, handling, and storage control
10. Certification methodology
11. RRWAC Compliance

### 2.1.7 Waste Forecasts

**NOTE:** *Subsection 2.1.7 applies only to generators of waste with a radioactive component, Subsections 4.5 Low-Level Waste, 4.6 Mixed Low-Level Waste, 4.7 Fluid With Radioactive/Hazardous Contamination, 4.8 Transuranic Waste, and 4.9 Mixed Transuranic Waste.*

Each generator of waste with a radioactive component shipped for storage, treatment, or disposal at an Idaho National Engineering and Environmental Laboratory (INEEL) treatment, storage or disposal facility (TSDF) shall provide an annual waste forecast on the following schedule:

1. Forecast form INEEL 435.25, Solid Radioactive Waste Forecast shall be provided to the affected generators no later than September 30 annually.
2. Affected generators shall accurately complete and submit the form annually, no later than November 15 to:

Lockheed Martin Idaho Technologies Company  
Waste Forecasts MS 2604  
P. O. Box 1625  
Idaho Falls, ID 83415-2604

## 2.2 Waste Generator Services Responsibilities

With respect to acceptance of materials or waste WGS is responsible to:

1. Maintain acceptance criteria current with all applicable requirements.
2. Provide onsite assistance to generator and receiving organization as appropriate.
3. Supply RCRA TSDF Waste Analysis Plans to generators as applicable.
4. Assist in training relative to this document.
5. Concur with generator's waste certification program (as applicable).
6. Ensure nonstandard material or waste forms and packaging are within the receiving facility permits, safety analysis, and performance assessment limits, as applicable, and are within the technical capacity of the receiving facility.
7. Authorize the generator to offer chemicals to be exchanged, recyclable materials, and waste to INEEL receiving facilities.
8. Verify chemicals to be exchanged, recyclable materials, and waste received by INEEL facilities, as applicable. Verification activities may include, but are not limited to:
  - a. Physical inspection of waste and packaging
  - b. Gross weight assessment
  - c. Radiological measurements
  - d. Radioassay
  - e. Intrusive inspection (including simple chemical tests)
  - f. Radiography
  - g. Head-space vapor/gas sampling.
9. Arrange for chemicals to be exchanged, recyclable materials, and waste to be shipped to offsite facilities.

## 2.3 Auditing

**NOTE:** *Section 2.3 applies only for generators who ship waste to the INEEL receiving facilities designated in this RRWAC.*

Auditing of waste generators for compliance with the requirements of this RRWAC shall be conducted periodically by DOE-ID or their designated representatives, normally the INEEL Waste Management Compliance Team (WMCT). The Navy Nuclear Propulsion Program, per Executive Order 12344, is exempt from provisions of DOE Order 5820.2A and is responsible for maintaining programs to establish compliance with applicable environmental statutes and regulations.

### **2.3 Auditing (continued)**

The audit program shall consist of an initial audit and periodic follow-up audits of generators utilizing the INEEL waste receiving facilities designated in this RRWAC. The initial audit will be conducted before a new generator's first shipment. Those generators that have not shipped waste in the past 24 months will be considered new generators. A graded approach will be applied to the audit process dependent upon the generator's waste types and quantities, the shipping frequency and demonstrated historical compliance with the RRWAC.

The WMCT audit team leader will be certified as Lead Auditor. Auditing skills and knowledge of applicable regulations will be maintained through periodic attendance to recognized environmental quality or waste management courses. All audit team members will be qualified at the discretion of the team leader.

An annual schedule of audits will be prepared by the WMCT for each fiscal year. This schedule will be available during the month of September prior to the beginning of the fiscal year. Copies will be sent to known generators and receiving facilities. Additional copies may be requested from the WMCT at (208) 526-0949. The annual schedule is subject to change to accommodate generator or receiver operational needs. Each audit will also be preceded with a letter to arrange an acceptable date, determine the time for the audit, and outline the procedure that will be followed.

### 3. CHARACTERIZATION

**NOTE:** *Chapter 3 is applicable only for recyclable materials and waste, excluding recyclable office waste and nonconditional industrial waste.*

#### 3.1 General

Characterization requirements that apply to recyclable materials and wastes are contained in Chapter 4 of this document. The generator's characterization process provides verifiable evidence of compliance to the applicable acceptance criteria. Characterization should be planned and performed in close coordination with Waste Generator Services (WGS) personnel. An open line of communication should be maintained throughout the entire characterization process to avoid unnecessary analysis, expense, and expenditure of time.

Two basic methods of characterization are available: (a) process knowledge, including standard protocols for sampling and laboratory analysis that are not specialized Resource Conservation and Recovery Act (RCRA) methods (SW-846) and other equivalent regulatory agency approved methods, and (b) specialized RCRA sampling and analysis for some RCRA regulated materials. Factual process knowledge, from a process waste assessment for example, influences the amount of sampling and analysis required to correctly characterize recyclable materials and waste.

#### 3.2 Characterization Criteria

1. Recyclable materials and waste offered for receipt at facilities included in this document shall be characterized to ensure proper utilization of recyclable materials and proper prevention, minimization, segregation, packaging, storage, treatment, transportation, and disposal of waste.
2. Appropriate records, statements, reports, and data that support characterization shall be maintained by WGS in auditable files.
3. A hazardous waste determination shall be conducted and documented on all solid waste, which includes LDR applicability, per 40 CFR 262.11.
4. If LDR is applicable, then conduct LDR assessment per 40 CFR 262.11 and 268.7.
5. Identify all applicable LDR standards for hazardous waste subject to the LDR.
6. Characterization shall include the following, as applicable:
  - a. Process knowledge, including
    - (1) Materials list and a process flow diagram
    - (2) Standard protocol sampling
    - (3) Standard protocol laboratory analysis
    - (4) Material safety data sheets

### 3.2 Characterization Criteria (continued)

- (5) Other documentation.
  - b. RCRA protocol sampling and analysis as appropriate (SW-846) and other equivalent regulatory agency approved methods
  - c. Internal quality-control checks used in a graded approach appropriate to the degree of hazard
  - d. For RCRA-regulated waste, adherence to the characterization methods established in the RCRA Waste Analysis Plan for the receiving waste management unit.
7. When required by the applicable acceptance criteria, requisite characterization data shall be communicated to the receiving organization through the use of the IWTS Material and Waste Characterization Profile (M&WCP) or WGS approved equivalent, and the IWTS Container Profile (CP) and Shipment Task Profile (STP) (electronic submittal) or Shipment Request and Certification Report (hardcopy) (SR&CR) or WGS approved equivalent. Data required by and entered into the Integrated waste Tracking System (IWTS) documenting waste streams and packaged waste shall be verified prior to approval of the characterization and container profiles.
- a. The IWTS M&WCP and the CP and STP or SR&CR or WGS approved equivalent must be completed, and verified.
  - b. Before shipment of any chemicals for exchange, recyclable materials, or wastes requiring approved IWTS M&WCP and CP and STP or SR&CR or WGS approved equivalent, WGS shall obtain appropriate approval.
  - c. Supporting documentation for the IWTS M&WCP or WGS approved equivalent shall be submitted, as required by WGS. Inadequate supporting data can result in delay until sufficient technical basis is available for proper characterization.
- NOTE:** *Supporting data includes copies of sample chain-of-custody records, where applicable.*
- d. Radiological characterization meets the specific criteria for each section.
  - e. Information pertinent to instruments, equipment, and procedures used for isotope detection and quantification are included in the Waste Certification Program for WGS concurrence. (BMP).
  - f. For recurring shipments of materials and waste streams having previously approved IWTS M&WCP, the generator shall update and reverify information annually or when changes in the process occur that alter the physical, radiological, or chemical characterization of the material or waste. Updates shall also be approved by WGS before shipment.



### 3.2 Characterization Criteria (continued)

8. If laboratory analysis is necessary, the generator and WGS shall use knowledge of the history, origin of the material, type of treatment available, and acceptance criteria, etc., to decide the type of analytical testing needed.
  - a. The generator is responsible to determine the appropriate sampling method, conduct all field and sampling quality assurance/quality control procedures, arrange for and coordinate with appropriate analytical laboratories, and document the sampling and analysis activities. Applicable waste analyses plans of the RCRA-regulated receiving facility provide specific criteria to be met for RCRA-regulated waste.
  - b. Sampling and analytical specific activities may be performed by another organization with specialized expertise.
9. All analytical services in support of waste management activities will be coordinated through the LMITCO Sample Management Office to ensure that laboratories meet specified quality requirements [reference letter from Jud Ellis (GEE-57-96)].
10. Generators at the INEEL whose activities are funded by DOE Environmental Management (EM), i.e., EM-30, EM-40, EM-50, EM-60, or EM-70, per DOE-ID letter OPE-ER-58-96 must obtain all analytical services, either from subcontracted laboratories or INEEL laboratories, through the INEEL Sample Management Office (SMO).
  - a. Generators at the INEEL whose activities are not funded by DOE EM are also encouraged to obtain analytical services through the INEEL SMO.
  - b. All Generators are encouraged to utilize the INEEL SMO data validation services to aid with the assessment of the data quality.
  - c. Use of the INEEL SMO ensures that the laboratory has been audited prior to initial subcontract award and annually. Also use of the SMO ensures use of laboratories whose performance is being monitored against set criteria with every data deliverable received.
11. Waste shall be categorized as waste streams to facilitate characterization and selection of the appropriate acceptance criteria. Characterization data obtained for a unique waste stream at different times shall be within the ranges documented in the IWTS Material and Waste Characterization Profile (M&WCP), as approved by WGS.
  - a. When acceptable process knowledge is documented and auditable to ensure that a particular constituent is not present in the waste, there is no requirement to test for that constituent. For instance, if a waste comes from a well-defined aqueous process and there are no organic chemicals associated with the process, then it is not necessary to test for volatile and semivolatile organics. Acceptable process knowledge can be documented by including a detailed process description or published data for the process with the submitted IWTS M&WCP.
  - b. Based on acceptable process knowledge, specialized RCRA analysis (SW-846 and other equivalent regulatory agency-approved methods), or both, all applicable RCRA

**3.2 Characterization Criteria  
(continued)**

Hazardous Waste Numbers must be accurately identified in accordance with Title 40, Code of Federal Regulations, Part 261 and 268 requirements.

12. Characterization conforming to specialized RCRA sampling and analysis requirements shall be performed in accordance with the applicable RCRA permit waste analysis plan. When specialized RCRA sampling and analysis is required, the analytical services shall be conducted by a laboratory that can produce documented evidence that the personnel and laboratory are qualified to perform such analysis.
13. As applicable submittal schedules for IWTS Material and Waste Characterization Profile (M&WCP), or IWTS container profile and Shipment and Relocation Profile (electronic submittal) or the Shipment Request and Certification Report (hardcopy):
  - a. Material and Waste Characterization Profile shall be submitted to the receiving organization a minimum of 30 calendar days before material or waste movement.
  - b. Hazardous waste for which the material and waste characterization data, IWTS M&WCP and the shipment data container profile and shipment task profile or SR&CR including supporting documentation, approved on or before the last working day of the month, will be included in the first shipment of the following month.
  - c. Mixed-Low-Level and Low-Level waste shipment data container profile and shipment task profile or SR&CR including supporting documentation, from approved waste streams, shall be provided to WGS a minimum of 16 working days before the generator's proposed shipment date.

**NOTE:** *Laboratory results will determine when the Material and Waste Characterization forms will be ready. The schedule above is provided to assist the generator in contracting for the appropriate turnaround time with the laboratories.*

## **4. ACCEPTANCE CRITERIA**

Chapter 4 defines specific acceptance criteria for reusable property, recyclable materials, and waste. These criteria are based upon applicable regulations, DOE Orders, and receiving facility specific requirements. The basis for each acceptance criterion in this section is listed in parentheses after the criterion. Provisions of the applicable Resource Conservation and Recovery Act (RCRA) Permit or RCRA Part A Permit Application (40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities") preempt any INEEL Reusable Property, Recyclable Materials, and Waste Acceptance Criteria should a discrepancy occur.

## **4.1 Reusable Personal Property**

Users of government personal property should ensure that other government programs and agencies have access to property that is no longer required by the program for which it was acquired.

### **4.1.1 General**

The following acceptance criteria shall apply to all excess property to be reutilized, exchanged, stored, or cannibalized. These criteria apply in addition to the criteria noted in the appropriate Subsections 4.1.2 through 4.1.6.

1. Property is accurately identified and disposition action documented [41 Code of Federal Regulations (CFR) 101-43.302b].
2. Radiological control surveys are performed and documented as required (*INEEL Radiological Control Manual*, LMITCO Manual 15A or DOE/EH-0256T, Table 2-2).
3. Environmental, safety, health, and quality reviews are accomplished as required [Best Management Practice (BMP)].
4. All personal property designated as pool items or assigned by a pool is returned to that pool for redistribution or disposal such as video equipment or electronic test equipment (41 CFR 101-25.109-2).

### **4.1.2 Personal Property to be Exchanged (Traded-in) or Disposed of Pursuant to Exchange/Sale Authority**

In addition to meeting all the criteria of Subsection 4.1.1, the following acceptance criteria shall also be met before returning property to the vendor for trade-in or exchange.

1. When exchange (trade-in) or disposal of property pursuant to exchange /sale authority is contemplated as a disposal option, contact Logistics & Property Management for processing assistance and approval of action (526-4500).
2. Logistics & Property Management will perform a property analysis and make a written determination of whether property should be exchanged (traded-in) or sold (41 CFR 101-46).

### **4.1.3 Personal Property to be Reused through Plant and Equipment Control System Custodian Transfer**

In addition to meeting all the criteria of Subsection 4.1.1, the following acceptance criterion shall also be met before transferring personal property on the Plant and Equipment Control System (PECOS) between INEEL property end users:

Current end user has submitted the appropriate transfer documentation to update the PECOS database or contacted their property management office and followed the appropriate instructions (BMP).

#### 4.1.4 Personal Property to be Cannibalized

In addition to meeting all the criteria of Subsection 4.1.1, the following criteria shall also be met before cannibalizing property.

**NOTE:** *It is a Federal offense to willfully destroy (i.e., render unusable for its designed purpose) any Government property without justification, required approvals, and complete documentation (41 CFR 109-1.520 or 1.51020).*

1. The cannibalization is in the best interests of the Government (BMP).

**NOTE:** *The LMITCO Property Control Department can assist in this determination.*

2. A written request is submitted to the LMITCO Property Control Department and includes the following: (BMP)
  - a. The PROPID of both the item to be cannibalized and the item(s) to use the cannibalized parts
  - b. Detailed justification for the action
  - c. Any special conditions that apply.
3. If the item is approved for cannibalization (BMP):
  - a. The LMITCO Property Control Department sends a Cannibalization PAR Form and cannibalization stickers to the originator.
  - b. Upon receipt of the PAR form, the originator removes the PROPID tag from the property and attaches it to the cannibalization PAR form, noting the details of the cannibalization action in the bottom portion of the PAR for future reference.
  - c. The PAR form is completed and returned to the LMITCO Property Control Department.
  - d. The property is then cannibalized and the desired pieces are added to other property, which maintain their original PROPID.
4. After cannibalization (BMP):
  - a. Cannibalization stickers are attached to each remaining piece of property.
  - b. Remaining pieces of property are excessed in accordance with RRWAC Subsection 4.1.5.

#### 4.1.5 Personal Property to be Excessed

In addition to meeting all the criteria of Subsection 4.1.1, the following acceptance criteria shall also be met before excessing any personal property to the Property Disposal Facility (CF-674):

1. The following forms are completed and preapproval is obtained:
    - a. INEEL form 580.07 (available in hard copy only), "Excess Property Report (EPR)" (BMP).
    - b. INEEL form 580.31, "Property Review Checklist (Tripwire)" (BMP).
  2. The copies of excess property documentation are sent to the Property Reutilization and Disposal Office for review and approval to excess.
  3. Other appropriate documentation is retained by the originator (BMP).
  4. Property does not contain any of the following: (BMP)
    - a. Friable asbestos
    - b. Nonfriable asbestos in need of repair or with a condition code of 6 or higher and scrap or salvage
    - c. Lead acid batteries (must be removed, except from vehicles and heavy equipment)
    - d. Chemicals [see INEEL Material Exchange Program (Subsection 4.1.6)]
    - e. PCBs (suspect items, such as transformers, ballasts, oil reservoirs, etc. must be certified or marked "PCB-Free")
    - f. Petroleum products (unless in a working vehicle or piece of equipment)
    - g. Radioactive sources or radioactively contaminated property, except as noted in Item 5.e. below
    - h. Used computer software and disks (contact the PC Asset Redistribution Center at 526-8137)
    - i. Used ribbons (must be removed from typewriters, printers, etc.)
    - j. Occupational Safety and Health Administration hazardous list items, e.g., mercury, exposed lead, or used film. For assistance, contact your environmental representative
    - k. Federal information processing equipment that has not been sanitized by a qualified software/hardware technician (return it to the PC Asset Redistribution Center)
- NOTE:** *Property must be marked to validate that the item has been sanitized.*
- l. Proliferation sensitive property.

#### 4.1.5 Personal Property to be Excessed (continued)

5. The following may be accepted under certain conditions (BMP):

**NOTE:** *Contact the LMITCO Property Reutilization and Disposal Office for guidance.*

- a. Lead, if it is totally encapsulated, if it is an integral part of a working unit, and if it is necessary for the intended use of the property, e.g., soldering, wiring, cable shielding
- b. Used tanks, barrels, cylinders, and containers that have been triple rinsed, and pipe, tubing, conduit, hose, pumps, compressors, etc.
- c. Scrap metal and lumber

**NOTE 1:** *Scrap metal or lumber pieces of sufficient size to be reused are to be sent to the Property Disposal Facility, CFA-674, not the INEEL Landfill Complex.*

**NOTE 2:** *Stainless steel must be segregated and identified as to type and shape.*

- d. Dumpster and dump truck loads

**NOTE 1:** *Materials must be segregated by type (i.e., wood, metals) and surveyed at the generator's facility. Stainless steel must be segregated from other metals and identified as to type and shape, e.g., pipe, plate, size.*

**NOTE 2:** *There must be no hazardous chemicals or chemical residues, items with property numbers, or pressurized containers.*

- e. Radioactive sources or radioactively contaminated property may be considered for transfer to another federal agency.
- f. Usable light bulbs and fluorescent tubes
- g. Rubber tires.

#### 4.1.6 Materials to be Exchanged

**NOTE 1:** *For exchange of unused materials, the owner is encouraged to use the INEEL Materials Exchange. The INEEL Materials Exchange offers unused materials to INEEL organizations and other Federal agencies (Federal Property Management Regulation 101-42). The process is managed by the INEEL Materials Exchange System Manager.*

**NOTE 2:** *Materials to be exchanged cannot be accepted into the INEEL Property Disposal Facility (CFA-674) but are transferred directly from their*

#### 4.1.6 Materials to be Exchanged (continued)

*original owner to the new owner. The LMITCO Property Control Organization will assist the INEEL Materials Exchange System Manager with contacts and documentation for any direct transfer to offsite Federal agencies.*

In addition to meeting all criteria of Subsection 4.1.1, the following acceptance criteria shall also be met before any material is accepted into the INEEL Materials Exchange Program:

1. The material is an unused substance such as a chemical, containerized gas, paint, oil, grease, degreaser, solvent, adhesive, grout, sealant, or pesticide (BMP).
2. The material has a current material safety data sheet (BMP).
3. The material is not radioactive or radioactively contaminated, with the exception of radiological calibration sources (BMP).
4. The material has not been designated as a waste (BMP).
5. The material is in the original manufactured container or in a secondary container that meets applicable Department of Transportation (DOT) and Occupational Safety and Health Act regulations for packaging and labeling (29 CFR).
6. All the above criteria are met and an INEEL form 450.17, Materials Exchange is completed and submitted to the INEEL Materials Exchange Manager to list the material in the INEEL Materials Exchange Database (BMP).

**NOTE:** *The INEEL Materials Manager may be contacted to assist the originator in completing INEEL forms 450.17 and 450.18.*

7. When another organization indicates they can use the material, INEEL form 450.18, Material Change of Custody, is completed and accompanies the shipment (BMP).
8. If the material is hazardous under DOT regulations, the material packaging and shipment is approved by a certified hazardous materials shipper (BMP).

**NOTE:** *WGS or the INEEL Materials Exchange System Manager may be contacted for additional information on this system.*

#### 4.1.7 Lead Shielding to be Reused

**NOTE 1:** *The Waste Reduction Operation Complex (WROC) Lead Facility (LF) maintains a supply of clean and radioactively contaminated lead shielding for INEEL use.*

**NOTE 2:** *In the event miscellaneous types of small quantities of lead are involved in a shipment, the WGS may be contacted for assistance.*



**4.1.7 Lead Shielding to be Reused  
(continued)**

**NOTE 3:** *In most cases, shipment of lead to the WROC-LF is not regulated by the Department of Transportation and shipping papers are not required (see 49 CFR 172.101 for exceptions).*

In addition to meeting all of the criteria of subsection 4.1.1, the following acceptance criteria shall also be met before shipping lead shielding to the WROC-LF.

**4.1.7.1 Lead Shielding (clean or radioactively contaminated)**

1. Lead shielding is:
  - a. Received for storage and ultimate disposition at PER-612 and associated portable storage units (PSUs)
  - b. In "as new condition."
  - c. Segregated and packaged per shape, brick, shot, blankets, etc.
2. A completed IWTS Material and Waste Characterization Profile for each waste stream has been approved by WGS. (DOE Order 5820.2A, Chapter III, 3.d)
3. Authorized packagings include preapproved metal boxes and a wooden box per drawing 447408, and others as approved on a case-by-case basis and:
  - a. Meets DOT quality requirements (49 CFR 173.474 and 49 CFR 173.475)
  - b. Wooden boxes are painted with near white, exterior, fire-retardant paint approximately 0.007-in. thick, and have a flame-spread rating of 25 to 75 per American Society for Testing and Materials (ASTM) E-84. (WM-F1-22-005, Uniform Fire Code Section 8003)
  - c. Closure (49 CFR 173.475)
  - d. Gross weight does not exceed 5,500 lb. (Design)
  - e. Use of a liner is recommended to prevent contamination of the box.
  - f. Making and labeling of packages to be shipped to the WROC-LF, include:
    - (1) One full set of the information required by this section will be placed on the top and opposite side(s) of each container so that the information for each container is always visible, legibly printed, stenciled, or neatly hand-lettered (BMP).
    - (2) For hazardous material shipments correct DOT markings (49 CFR 172, Subpart D) and labels (49 CFR 172, Subpart E).
    - (3) Extraneous markings, such as free-hand spray paint or graffiti, are removed or painted over (BMP).
    - (4) Waste package gross weight (BMP).

**4.1.7 Lead Shielding to be Reused  
(continued)**

- (5) Shipper's complete name and address (BMP).
  - (6) Shipper's unique container identification number, which may be:
    - (a) A marking, in which the first two digits are the last two digits of the current calendar year and the last three digits are the container number [a new sequence of container numbers (commencing with 001) is initiated each January 1]
    - (b) A barcode number issued by the receiving organization (BMP).
  - (7) Maximum radiation level at contact and at 1 meter in air (BMP).
4. The following documentation accompanies the shipment:
- a. Properly completed shipping papers (49 CFR 172.202,203,204)
  - b. A properly prepared IWTS Shipment Request and Certification report, as required by WGS or the receiving facility
  - c. An inventory list detailing by item, the contents of each package (BMP)
  - d. A properly completed INEEL form 435.02# "No Radioactivity Added Certification," allowing free release to unrestricted areas. (clean lead only)

## 4.2 Recyclable Materials

### 4.2.1 General

**NOTE:** *The Property Disposal Facility (CFA-674) can accept rubber tires, lumber, and miscellaneous metals such as aluminum, steel, copper, brass, and iron. These items are covered in Section 4.1.*

The basis for the following criteria of materials being recycled on-site or sent to off-Site vendors for recycling is the vendor subcontracts. As new subcontracts are developed, criteria may change and additional materials will become recyclable. Contact Waste Generator Services (WGS) for information on such changes.

### 4.2.2 Office Material to be Recycled

Office material that can be recycled under current vendor subcontracts includes laser jet printer toner cartridges. The following acceptance criteria shall be met before shipping office waste for recycling.

1. Used toner cartridges from laser jet printers are packaged in the box that the replacement toner cartridge was delivered, with a yellow "Think Security" label, form 241.09, affixed that includes the return address, sending the used cartridge to "RECYCLE" (no mail stop).
2. Office waste to be recycled is addressed in 4.3.2 Industrial Waste to be Recycled.

### 4.2.3 Nonradioactive Metals to be Recycled

The following acceptance criteria shall be met before shipping nonradioactive metal to be recycled by subcontracted vendor recycling facilities:

1. A completed IWTS Material and Waste Certification Profile (M&WCP) has been approved by WGS.
2. Shipments are packaged to meet 49 CFR 173.3 and labeled to meet 49 CFR 172.400 requirements.
3. Shipments meet the applicable vendor acceptance criteria as supplied by the applicable GI.
4. Shipments to LMITCO subcontracted vendors are arranged with WGS for proper coordination with the vendor, including WGS approval of the completed IWTS M&WCP for material characterization and IWTS Shipment and Relocation Profile for packaging, shipping, and certification.
5. Shipments are accompanied by the following documents:
  - (1) A properly completed INEEL form 435.2#, No Radioactivity Added Certification.
  - (2) Proper shipping papers (49 CFR 172.202, 203, and 204)

#### 4.2.3 Nonradioactive Metals to be Recycled (continued)

- (3) EPA form 8700-22, Uniform Hazardous Waste Manifest, as applicable (40 CFR 262, Subpart B and 40 CFR 266, Subpart F).

**NOTE:** *Subpart F of 40 CFR 266 requires that economically significant amounts of precious metals be manifested in addition to hazardous waste.*

6. Batteries are not drained, broken, cracked or leaking.
7. The metal type has been approved to be recycled at an off-Site vendor.

**NOTE:** *Stainless steel, iron, copper, and some other metals may be accepted as personal property to be excessed (see Subsection 4.1.5).*

8. Examples of metal types presently approved for recycling include

- a. Brass
  - b. Bronze
  - c. Cadmium sheet metal
  - d. Electronic circuit boards
  - e. Lead as
    - (1) Tin solder
    - (2) Shielded copper cable
    - (3) Sheet plate, brick, shot or shapes
    - (4) Scrap, no foreign material or assemblies with other materials
    - (5) Acid liquid cell or gel cell batteries
    - (6) Spent bullets.
  - f. Silver
    - (1) Recovery canisters (including ion exchange media containing silver)
- NOTE:** *Plastic buckets with secured lids are an example of acceptable packaging for silver recovery canisters.*
- (2) Photographic film (including microfilm, microfiche, and x-ray film)
  - (3) Scraps, discs, rods, and wire

#### 4.2.3 Nonradioactive Metals to be Recycled (continued)

**NOTE:** *Strong, tight, cardboard boxes are acceptable packaging for silver scrap.*

- (4) Zeolite
- (5) Batteries.

**NOTE:** *Additional metals will be approved for recycling as recycling subcontracts are established. Generators will be notified when this occurs, or contact WGS for information.*

g. Lead scrap meets the following requirements:

**NOTE:** *Usable lead shielding such as blankets, clean bricks, or bagged shot, all in "as new" condition, should be stored for reuse, not recycled (see Subsection 4.1.7, Lead Shielding to be Reused).*

- (1) Does not contain:
  - (a) Lead glass
  - (b) Other materials contaminated with lead (e.g., gloves, pallets, blotter paper, soil, debris)
  - (c) Lead combined with other components (e.g., tape, metals, plastics)

**NOTE:** *Some assemblies may be accepted on a case-by-case basis if approved by WGS.*

#### 4.2.4 Other Nonradioactive Materials to be Recycled

**NOTE:** *Contact WGS for guidance on recycling of other nonradioactive materials.*

1. Wood that cannot be excessed may be sent to the wood chipper at the INEEL Landfill Complex on a case-by-case basis.
2. Used oil and unused fuel
3. Fluorescent light tubes, high-intensity discharge lamps, and incandescent bulbs.
  - a. Segregate these as follows:
    - (1) Fluorescent light tubes (non-shatter shielded)-crushed
    - (2) Fluorescent light tubes (shatter shielded)-not crushed
    - (3) High-intensity discharge lamps crushed or not crushed. (However, standard crushers cannot crush these quartz tubes.)

**4.2.4 Other Nonradioactive Materials to be Recycled  
(continued)**

- (4) Lead buttons, if previously separated from bases of incandescent bulbs or high-intensity discharge lamps (no tubes or lamps).
- b. Mark as "Recyclable RCRA scrap metal" (RCRA scrap metal does not need to be stored in a TAA).
- 4. Shipments are accompanied by the following documents:
  - (1) A properly completed INEEL form 435.2#, No Radioactivity Added Certification, or generator's equivalent.
  - (2) Proper shipping papers (49 CFR 172.202, 203, and 204)
  - (3) EPA form 8700-22, Uniform Hazardous Waste Manifest, as applicable (40 CFR 262, Subpart B and 40 CFR 266, Subpart F).

**NOTE:** *Subpart F of 40 CFR 266 requires that economically significant amounts of precious metals be manifested in addition to hazardous waste.*

## 4.3 Industrial Waste

The Idaho National Engineering and Environmental Laboratory (INEEL) Landfill Complex disposes of industrial waste generated by contractors at the INEEL.

### 4.3.1 General

Rubber tires, refrigeration equipment, and scrap metal or lumber pieces of reusable size are sent to the Property Disposal Facility, CFA-674, not to the INEEL Landfill Complex. Contact the Property Disposal Facility Operator before cutting (sizing) any wood that may be reusable. Other wood material may be recycled as specified in Subsection 4.2.4. Batteries, metallic lead, printed circuit boards, solder, and fluorescent light tubes may be recyclable (see Subsection 4.2.3 and 4.2.4).

The following acceptance criteria shall apply to all industrial wastes to be disposed of at the INEEL Landfill Complex. These criteria apply in addition to the criteria noted in the appropriate Subsections 4.3.2, 4.3.3, or 4.3.4.

1. The waste meets the definition of industrial waste in this document.
2. The waste does not contain radioactive items that exceed the radioactivity limits for unrestricted release of items and materials according to the *INEEL Radiological Control Manual*, LMITCO Manual 15A or DOE/EH-0256T, Table 2-2.
3. The waste does not contain
  - a. Uncontainerized free liquids of any kind (BMP)
  - b. Containerized free liquids exceeding 1 gal per container (BMP)

**NOTE:** *A goal for the INEEL Landfill Complex is to dispose of no free liquids at the Complex. Free liquids should be disposed of by other available means when feasible.*

  - c. RCRA regulated constituents [40 Code of Federal Regulations (CFR) 261]
  - d. RCRA-regulated volatile organic compounds (VOCs) as free liquids (40 CFR 261)
  - e. Metallic lead or Terne-plated oil filters (40 CFR 261)
  - f. Inflatable rubber tires (auto, truck) (BMP)
  - g. Batteries except for "mercury free" or "zero mercury added" carbon-zinc or alkaline batteries (40 CFR 261)
  - h. Printed circuit boards (40 CFR 261)
  - i. Waste from spills of PCB liquids that are  $\geq 50$  ppm PCBs (40 CFR 761)
  - j. PCBs  $\geq 50$  ppm (40 CFR 268 and 40 CFR 761.60)
  - k. RCRA-regulated solder (40 CFR 261)
  - l. Wood or metal pieces with the largest dimension greater than 8 ft (BMP)

4.3.1 Industrial Waste General  
(continued)

**NOTE:** *Before cutting an item to meet this criterion, the generator should call the LMITCO Property Reutilization and Disposal Office to determine if the item can be accepted by them for reuse.*

- m. Reusable or recyclable wood/lumber (BMP)
  - n. Refrigeration equipment containing refrigerant (40 CFR 82.156) or lubricating oils (BMP)
  - o. Communication cable containing lead (40 CFR 261)
  - p. Used or unused medical sharps (anything used to inject, draw blood, cut or scrape tissue, such as needles and scalpels) (BMP).
- 4. Empty containers greater than 1 gal have plugs or lids removed (BMP).
  - 5. Aerosol cans are empty (BMP).

**NOTE:** *Empty is when all the contents within an aerosol can have been removed and cans are at ambient pressure.*

- 6. Empty containers that have held hazardous materials have been emptied in accordance with 40 CFR 261.7.

**NOTE:** *If a container holding hazardous materials does not meet the definition of "RCRA Empty", the container must be managed appropriately according to its contents.*

- 7. Waste transported to the landfill complex by the generator or generator's subcontractor

- a. Is transported by personnel that have obtained an INEEL form 435.31, INEEL Landfill Complex User's Permit (BMP)

**NOTE:** *The INEEL Landfill Complex User's Permit INEEL form 435.31 is issued at the INEEL Landfill Complex Office after the driver has successfully completed the required training (approximately 10 minutes of instruction). The permit is valid for one year from the issue date.*

- b. Is transported in equipment that is designed and constructed to be readily emptied and is kept clean (BMP)
- c. Is transported by vehicles that comply with the Idaho State Rules and Regulations and Idaho Solid Waste Management Regulations and Standards, Title 1, Chapter 6, 1-6012
- d. Is suitably enclosed or covered to prevent roadside littering, attraction of vectors (such as rodents), or creation of other nuisances (BMP).



#### 4.3.1 Industrial Waste General (continued)

8. Nonstandard materials or nonstandard packages (see Section 1.2, Item 4)
  - a. Are transported to the INEEL Landfill Complex by the waste generator (BMP)

**NOTE:** *In some cases arrangements can be made for pickup by WROC Operations. Contact WGS for guidance.*
  - b. Are accompanied by a completed and signed INEEL form series 435.9#-435.13# (BMP).

#### 4.3.2 Industrial Waste to be Recycled

In addition to meeting all criteria of Subsection 4.3.1, the following acceptance criteria shall also be met before shipping waste to the Industrial Waste Handling and Cubing Facility.

1. Combustible Solid Waste
  - a. Is from DOE-ID controlled or authorized facilities
  - b. Contains paper (any color or type), magazines, books, cardboard, cloth, plastics, sized/chipped wood, and/or other combustible materials.
  - c. Paper containing sensitive unclassified information is sealed in a box or manila envelope, and addressed using INEEL form 473.73 "Checklist For Unclassified/Sensitive Information Recycle/Destroy" (Sticker) with the generator's name and Mail Stop as the return address. Small quantities can be mailed through the INEEL base freight at 526-9925.
2. Does not contain
  - a. Classified information
  - b. PCBs
3. For additional information, contact Industrial Waste Operations at 526-4993 or 526-1897.

#### 4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex

In addition to meeting all the criteria of Subsection 4.3.1, the following acceptance criteria shall also be met before shipping conditional industrial waste to the INEEL Landfill Complex.

1. Each shipment of conditional industrial waste is accompanied by a copy of the signed approved INEEL form series 435.9#-435.13# or WGS approved equivalent (BMP).

**NOTE:** *Contact WGS to determine which portions of the form need to be completed.*

**4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex**  
(continued)

2. Each waste shipment is accompanied by a completed generator portion of INEEL form 435.27, INEEL Landfill Complex Solid Waste Log, available at the INEEL Landfill Complex (BMP).
3. Conditional waste is transported to the INEEL Landfill Complex by the generator and is segregated from nonconditional waste (BMP).

**NOTE:** *In some cases, arrangements can be made for pickup by WROC Operations. Contact WGS for guidance.*

4. Conditional waste consists only of wastes listed in Items a. through u. below:

**NOTE:** *See Item 8 for specific disposal requirements for the following items.*

- a. Nontraining-related personal protective equipment, including anti-C clothing (BMP)

**NOTE:** *See Subsection 4.3.3, Item 3.b for disposition of training-related items marked with a radiation symbol.*

- b. Nontraining-related items marked with a radiation symbol (other than documents) or colored magenta to indicate radiological hazard (BMP)
- c. Consumer products containing radioactive materials (household type smoke detectors, mantles from lanterns, etc.) (BMP)
- d. Oil filters (BMP)
- e. Fuel filters, transmission oil filters, and specialty filters (BMP)
- f. HEPA filters (BMP)
- g. Vegetable oil and grease (BMP)
- h. Refrigeration equipment (BMP)
- i. Asbestos-containing materials (BMP)
- j. PCM, such as soil, sand, gravel, or other earthen material (BMP)
- k. Pharmaceuticals or medications from INEEL medical services (BMP)
- l. Animal carcasses larger than coyote size (BMP)
- m. Lead- or chrome-based paints or paints containing organic compounds subject to hazardous waste determination (BMP)
- n. Printed circuit boards subject to hazardous waste determination (BMP)
- o. Metal solder subject to hazardous waste determination (BMP)

**4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex**  
(continued)

p. Communication cable subject to hazardous waste determination (BMP)

q. Brass or bronze (BMP)

**NOTE:** *Recycling spent light bulbs, tubes, and lamps is preferable to disposal. Contact WGS for recycling information.*

r. Incandescent light bulbs

s. Fluorescent tubes and high-intensity lamps (BMP)

t. Fluid-filled capacitors and fluorescent light ballasts that do not have a label reading "No PCBs."

5. A hazardous waste determination (40 CFR 261), the results of which are documented on the completed and signed INEEL form series 435.9#-435.13#, has been completed for the following waste forms:

**NOTE:** *A hazardous waste determination may require chemical analysis if other process knowledge is insufficient.*

a. Lead- or chrome-based paints

b. Paints containing organic compounds

c. Printed circuit boards

d. Metal solder

e. Communication or telephone cable.

f. Brass or bronze (BMP)

g. Incandescent light bulbs with lead buttons intact (40 CFR 261).

**NOTE:** *Spent lamps, tubes, and bulbs (1) are segregated into crushed and whole and into the following waste streams for hazardous waste determinations: fluorescent (no shatter shield), fluorescent shatter shield, incandescent, low sodium, high sodium, metal halide, mercury vapor; (2) are tested by container as follows: (a) fluorescent tubes: TCLP mercury and total mercury; (b) high-intensity discharge lamps: TCLP lead, TCLP mercury and total mercury; (c) incandescent bulbs: TCLP lead. WGS may require other specific tests.*

6. Fluid-filled capacitors and fluorescent light ballasts that do not have a label reading "No PCBs" are accompanied by manufacturer's documentation that states that these items do not exceed the 50 ppm PCB limit or do not contain PCBs (see 40 CFR 268 and 40 CFR 761.60).

**4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex**  
(continued)

7. Containers that have held hazardous materials and are not emptied to meet 49 CFR 173.29(b) are accompanied by a shipping paper that meets the requirements of 49 CFR 172.203(e) and 49 CFR 173.29(a).
8. Conditional wastes listed in Item 4 are prepared for disposal as follows:
  - a. Personal protective equipment, including anti-C clothing and items marked with a radiation symbol (other than documents), are packaged in "see through" plastic bags (BMP).
  - b. Consumer products containing radioactive materials (household type smoke detectors, mantles from lanterns, etc.) are packaged in "see through" plastic bags (BMP).

**NOTE:** *When "see through" plastic bags can cause equipment operating problems at the generator location, opaque bags may be used if approved in writing by WGS.*
  - c. Non-terne plated used oil filters that are not mixed with characteristic hazardous waste if these oil filters have been gravity hot-drained using one of the following methods: [40 CFR 261.4 (b) (13)]
    - (1) Puncturing the filter anti-drain back valve or the filter dome end and hot-draining;
    - (2) Hot-draining and crushing;
    - (3) Dismantling and hot-draining; or
    - (4) Any other equivalent hot-draining method which will remove used oil.
  - d. Fuel filters, transmission oil filters, and specialty filters are shown by analysis not to be hazardous waste and documented on a completed and signed INEEL form series 435.9#-435.13# as approved by WGS (BMP).
  - e. Vegetable oil and grease from cafeterias is congealed in solid form and contained in a closed metal or plastic container (BMP).
  - f. Refrigeration equipment meets the following requirements:
    - (1) Regulated chlorofluorocarbon ("freon" type) refrigerant has been removed by an EPA-certified technician (40 CFR 82.156)
    - (2) Lubricating oils have been removed (BMP)
    - (3) Fluid-filled capacitors not marked "No PCBs" have been removed (BMP)
    - (4) INEEL form 435.35, Refrigeration/Air Conditioning Appliance Disposal Certification is completed and submitted to the INEEL Landfill Complex Office (40 CFR 82.156).

**4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex**  
(continued)

g. Category I Nonfriable asbestos containing roofing material for disposal at the INEEL Industrial landfill:

- (1) Meets the requirements of 40 CFR 61 Appendix A to Subpart M, "Interpretive Rule Governing Roof Removal Operations." (Reference immediately follows 40 CFR 61.157.)
- (2) A properly completed INEEL form 450.04 Asbestos Removal Notification Form accompanies the approved INEEL series 435.9#-435.13# as specified in 4.3.3.1.
  - (a) Planners/project managers/facility managers shall prepare INEEL form 450.04 "Asbestos Removal Notification Form" prior to the start of any renovation or demolition operation that will disturb roofing material. (40 CFR 61.149)

**NOTE:** *All building demolitions require a NESHAP 10-day notification be submitted to EPA prior to the start of the demolition activity regardless of the presence of asbestos containing material. (40 CFR 61.145)*

- (b) The form 450.04 and a 10-day notification, INEEL form (to be issued as necessary) will be sent to Environmental Affairs National Emission Standard for Hazardous Air Pollutants (NESHAPS) point of contact, R. D. Delmore at MS 3228, (Environmental Affairs) to determine if the renovation/demolition and disposal activities are regulated by 40 CFR 61 Subpart M, for identification of other environmental requirements (as necessary), and tracking.
- (3) Can be sent in bulk conveyance to the landfill for disposal as non-NESHAP regulated waste.
- (4) Is covered with a tarpaulin or equivalent during transport, when sent in bulk.
- (5) Is preceded by a 24-hour advance notice to the facility operator, before delivery.

h. Nonfriable and friable asbestos (other than Category I Nonfriable asbestos containing roofing material) for disposal at the INEEL Asbestos Landfill meets the following requirements.

- (1) The waste is packaged in bags or other nonrigid packagings which are dust-and sift-proof and which are contained in strong tight packaging [BMP, adapted from 40 CFR 61.150(a)(1)(iii), 40 CFR 61.154(e)(1)(iv), and 49 CFR 173.216(c)(4)].

**4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex  
(continued)**

- (2) Packaging is labeled per 49 CFR 172.101 (see also 29 CFR 1910.1200, Appendix E) and include the following information:
  - (a)

**DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD**
  - (b) Name and address of generator.
- (3) The words "Friable Asbestos," are included on the packaging (BMP and 29 CFR 1910.1200, Appendix E) and in the applicable section of INEEL form series 435.9#-435.13# [40 CFR 61.154(e)(1)].
- (4) 24-hour advance notice is given to the facility operator before delivery of asbestos-containing waste.
- i. Friable asbestos also meets the following additional requirements:
  - (1) Shipment has been coordinated through LMITCO Packaging and Transportation Department (BMP)
  - (2) A completed INEEL form 450.04 accompanies the approved INEEL series 435.9#-435.13# as specified in 4.3.3.1.

**NOTE:** *A Uniform Hazardous Waste Manifest may be used, marked "On-Site Shipment" in Block 15.*
- j. Petroleum contaminated earthen material (PCM), such as soil, sand, gravel, or other earthen material that undergoes land treatment landfarming
  - (1) Has been subjected to a hazardous waste determination (40 CFR 262.11) as documented on the INEEL form series 435.9#-435.13# (BMP).
  - (2) Has been analyzed for the constituents listed in Table 4.3.2-1 [DEQ 1992. Idaho Department of Health and Welfare, Division of Environmental Quality (DEQ), Division of Community Programs, "Guidelines for TPH Analysis of Petroleum Contaminated Soils"] and for any other analyses required by the receiving organization generator interface, as documented on the INEEL form series 435.9#-435.13# (BMP).
  - (3) Is technically suitable for landfarming as determined by the receiving organization (BMP).

**4.3.3 Conditional Industrial Waste to be Disposed of at the Idaho National Engineering and Environmental Laboratory Landfill Complex**  
(continued)

**Table 4.3.3-1. Sample Analysis Guidance for Petroleum-Contaminated Material to be Landfarmed at the INEEL Landfill Complex.**

Analysis required	Type of Petroleum Contaminant			
	Unleaded Gasoline	Diesel Fuel	Fuel Oil, Lube Oil, Bunker Oil	Waste Oil
Total petroleum hydrocarbons (TPH)	x	x	X	x
Volatile organic constituents (VOCs)	x	x	X	x
Toxicity characteristic leaching procedure (TCLP) constituents	x			x (metals and benzene only)
Xylene	x			
Benzene	x			
PCBs				x
Chlorinated Solvents				x

(4) Has been approved by DOE-ID and the Idaho DEQ.

(5) Received by WROC Operations after preliminary negotiations. (BMP)

k. Pharmaceuticals or medications are delivered by the INEEL Occupational Medical Program Administrator or designated alternate (BMP).

l. Incandescent light bulbs and high-intensity discharge lamps have lead buttons on the base removed.

**4.3.4 Nonconditional Industrial Waste to be Disposed at the Idaho National Engineering and Environmental Laboratory Landfill Complex**

In addition to meeting all the criteria of Subsection 4.3.1, the following acceptance criteria shall also be met before shipping nonconditional industrial waste to the INEEL Landfill Complex.

1. Nonconditional waste does not contain conditional waste listed in Item 4 in Subsection 4.3.3 (BMP).
2. Nonconditional waste to be picked up by WROC Operations is in dumpsters that are
  - a. Provided by WROC Operations for nonconditional waste (BMP)
  - b. Accessible (not blocked by vehicles or equipment) (BMP)
  - c. In the approved locations as placed by WROC Operations (BMP).

**4.3.4 Nonconditional Industrial Waste to be Disposed at the Idaho National Engineering and Environmental Laboratory Landfill Complex**  
(continued)

**NOTE:** *Dumpsters are not to be moved by facility personnel except in emergency situations (BMP).*

3. Compactible, nonconditional waste

- a. Contains only compactible material [cafeteria waste, paper, sweepings, office waste, small animal carcasses (coyote size and smaller), nonhazardous laboratory waste, clothing, etc.] (BMP)
- b. Containing personal protective equipment, including anti-C clothing, and items marked with a radiation symbol, have been used only for training and are marked as such (BMP)

**NOTE 1:** *See Subsection 4.3.3, Item 4 for disposition of nontraining-related anti-C clothing and nontraining-related items marked with a radiation symbol.*

**NOTE 2:** *Documents that contain figures of radiation symbols are excluded from this criterion.*

- c. Which is to be picked up by WROC Operations is in dumpsters supplied by WROC Operations (BMP)
- d. If packaged, is packaged in "see through" plastic bags (BMP)

**NOTE:** *When "see through" plastic bags can cause equipment operating problems at the generator location, opaque bags may be used if approved in writing by WGS.*

- e. Has cafeteria waste packaged and separated from other waste (BMP)
- f. Does not contain empty rigid containers larger than 5-gal capacity (BMP).
- g. Incandescent light bulb base "lead buttons" have been removed.
- h. Carbon, zinc, and alkaline batteries
  - (1) Are clearly marked "ZMA" (zero mercury added), "mercury free", or display the "green" tree, or
  - (2) Are manufactured in the U.S. after 1993, and
  - (3) Polaroid film pack batteries manufactured after 1988.



#### 4.3.4 Nonconditional Industrial Waste to be Disposed at the Idaho National Engineering and Environmental Laboratory Landfill Complex (continued)

4. Noncompactible, nonconditional waste in dumpsters to be picked up by WROC Operations contains only nonreusable metal or nonrecyclable, nonreusable wood, with wood segregated from metal (BMP).

**NOTE:** *Contact WGS for guidance.*

5. Fluorescent tubes having green aluminum end caps are delivered to the appropriate area within the INEEL Landfill Complex.

**NOTE:** *Until site wide generation volume is established, personnel responsible for changing out light bulbs will bring the spent fluorescent tubes with green aluminum end caps, or equivalent environmentally friendly fluorescent tubes, to the landfill,*

- a. packed in the original shipping cartons
  - b. in full carton lots.
6. The following noncompactible, nonconditional waste is delivered by the generator to the appropriate area within the INEEL Landfill Complex (BMP):

**NOTE:** *In some cases arrangements can be made for pickup by WROC Operations. Contact WGS for guidance.*

- a. Concrete
  - b. Masonry items
  - c. Asphalt
  - d. Soil
  - e. Gravel.

#### 4.3.5 Industrial Waste to be Disposed of at Off-Site Facilities

Waste generated by Idaho Falls facilities that is disposed at the Bonneville County Landfill must meet all requirements for that landfill. In addition, generators shall evaluate their wastes to ensure disposal complies with applicable regulations. Acceptance of the waste at off-Site facilities does not relieve generators of their environmental liability and responsibility for regulatory compliance, as directed under the Federal Facilities Compliance Act.

## 4.4 Hazardous Waste

### 4.4.1 General

The following acceptance criteria shall apply to all hazardous nonradioactive waste generated at the INEEL. These criteria apply in addition to the criteria noted in the appropriate Subsections 4.4.2 through 4.4.7.

**NOTE:** *RCRA statutory and permit requirements preempt any other requirements when there is a potential conflict. Waste acceptance is subject to capacity limitations of the receiving facility.*

1. RCRA hazardous waste determination meets the requirements in 40 CFR 262.11.
2. A completed Integrated Waste Tracking System (IWTS) Material and Waste Characterization Profile (M&WCP) for each waste stream has been submitted to and approved by WGS, and is current within 12 months of the waste shipment to the receiving facility (BMP).

**NOTE:** *The submitted IWTS M&WCP or form series is reviewed by WGS for the initial receiving organization in coordination with WGS or other appropriate representatives of facilities that have planned to receive the waste for subsequent treatment or disposal, as applicable.*

3. A computer-generated Shipment and Relocation Profile (S&RP), has been completed for each waste package before shipment (RCRA Permit).
4. The following documentation accompanies each shipment of waste at the INEEL:
  - a. For RCRA hazardous waste and TSCA-regulated waste only, EPA Form 8700-22, Uniform Hazardous Waste Manifest (40 CFR 263). For INEEL on-Site shipments, Block 15 of the manifest is marked "On-Site Use Only" (RCRA Permit).
  - b. INEEL form 435.02, No Radioactivity Added Certification.
  - c. Land disposal restriction notifications and certifications as required by 40 CFR 268.7 and 40 CFR 268, Subpart D, as applicable, have been submitted to and approved by the receiving organization.

**NOTE:** *40 CFR 268.7 gives the required content of the applicable notices and certifications.*

- d. Inventory sheets for lab packs (RCRA Permit).
- e. A properly prepared IWTS Shipment Request and Certification report, as required by WGS or the receiving facility.
- f. Any waste verification required by WGS is noted as complete and approved by WGS (BMP).

**4.4.1 Hazardous Waste General  
(continued)**

5. The receiving facility WAP requirements are met (40 CFR 264/265.13).
6. The waste does not contain
  - a. Radioactive waste (RCRA Permit, BMP for others)
  - b. Undeclared radioactive materials (BMP)
  - c. Undeclared hazardous waste [40 CFR 262.10(e)]
  - d. RCRA hazardous waste having EPA RCRA hazardous waste numbers not included in the receiving TSDFS RCRA Part A Permit.
  - e. Pressurized vessels or containers, including compressed gas cylinders, other than pressurized aerosol cans.
  - f. A gaseous waste form, except for vented aerosol cans (RCRA Permit).
  - g. New, unused chemical products, unfamiliar wastes, or wastes having waste numbers of D003, P, or U, unless specifically approved by the receiving facility GI.
  - h. Waste generated by non-Department of Energy (DOE) facilities or by DOE facilities that are more than 40 miles from Idaho National Engineering and Environmental Laboratory (INEEL) Site boundaries (RCRA Permit).
  - i. Free liquids unless packaged as such (BMP).
7. Total volatile organic concentrations in wastes containing total volatile organics greater than 500 ppm by weight are determined as in 40 CFR 264/265.1084(a) or, for treated wastes, 40 CFR 265.1084(b), and is packaged in DOT authorized containers that meet one of the following requirements (40 CFR 265.1086):
  - a. The container capacity is less than 26 gal
  - b. The container capacity is less than 120 gal and the container meets applicable requirements in 49 CFR 178
  - c. The container capacity is more than 26 gal, does not meet applicable requirements in 49 CFR 178, but is documented in the IWTS Shipment and Relocation Profile to not leak VOCs after initial closure, as determined using EPA Method 21 in 40 CFR Part 60, Appendix A.
8. Waste is not and does not have the potential to be
  - a. Department of Transportation (DOT) Class 1 explosive or Class 4 Division 4.1 flammable solid that meets the definition of a wetted explosive under 49 CFR 173.124(a)(1) as identified in 49 CFR 173, Subparts C and D (RCRA Permit).

**4.4.1 Hazardous Waste General**  
**(continued)**

**NOTE:** *See 49 CFR 173.53 for correspondence of these explosives with explosives formerly identified as Class A, B, and C.*

- b. Pyrophoric material, as defined in 49 CFR 173.124(b)(1), or shock-sensitive material, as confirmed by the receiving organization WGS (RCRA Permit).

**NOTE:** *Contact the WGS for information regarding shock sensitive materials.*

- c. Forbidden material, as defined in 49 CFR 173.21, or forbidden explosives, as defined in 49 CFR 173.54.

- 9. Surface contamination on waste, packages, transport devices, and pallets does not exceed the radioactivity limits for unrestricted release of items and materials as specified in the *INEEL Radiological Control Manual*, LMITCO Manual 15A or DOE/EH-0256T, Table 2-2.

**NOTE:** *Additional radiological requirements may be imposed to meet facility-specific requirements (see the applicable RRWAC section(s) for the intended receiving facility or facilities).*

- 10. Liquid waste containers are never allowed to freeze

- 11. Debris waste

- a. With sharp edges or projections is taped or otherwise covered before packaging (BMP).
- b. That is packaged does not contain free liquids (BMP).
- c. Completed forms are sent to the receiving facility prior to shipment (BMP).

- 12. Containers are loaded so that

- a. Heavy items are placed at the bottom of the container (RCRA Permit).
- b. Bulky and heavy items are blocked and/or braced inside the waste containers to prevent a shift of the waste that may reduce the effectiveness of the package during transport and handling (BMP, 49 CFR 173.24).
- c. To the fullest extent practicable, and as consistent with the requirements of any subsequent receiving TSDF, all void space for non-liquid, dry waste is filled with packing material, including appropriate blocking and bracing (RCRA Permit).
- d. For liquids only, a minimum 10% void space remains in the container (RCRA Permit).

4.4.1 Hazardous Waste General  
(continued)

**NOTE:** *Floor loading limits and handling equipment capacities may limit the weights of packages that otherwise comply with DOT requirements. Contact WGS to determine such limits.*

13. Wastes within a container are compatible with each other (49 CFR 173.24(e), 49 CFR 177.848, 40 CFR 264.17, 264.177 and 40 CFR 264.177).

**NOTE:** *Examples of resources that may be used to determine compatibility are the tables in Appendix V of 40 CFR 264, 40 CFR 265, and 49 CFR 177.848*

14. Inner and outer packaging, including liners, absorbents and cushioning materials are
- a. Appropriate for the waste content and form (49 CFR 173.24)
  - b. DOT authorized [49 CFR 173.22, 173.24(e)]
  - c. Compatible with the wastes contained [49 CFR 173.24(e), 49 CFR 177.848, and 40 CFR 264.172].
15. Outer containers are in new or as-new condition, free of bulges, holes, swelling, significant rust, dents, or similar evidence of degradation (RCRA Permit, 49 CFR 173.475).

**NOTE:** *WGS will have the final authority as to what constitutes degradation.*

16. Gasketing, pressure relief, or venting requirements and provisions, if necessary, are as specified in 49 CFR 173.24 and are included on the information submitted with IWTS Shipment and Relocation Profile for review and approval by WGS (RCRA Permit).
17. When so equipped open head drum bolt rings have each bolt secured by a lock nut (RCRA Permit).
18. Combination packaging (lab packs) meet the specific lab pack requirements in 40 CFR 264.316, 49 CFR 173.12, and 49 CFR 173.24a(a).
19. Packaging, including inner packaging in combination packaging, is properly closed, secure, and leakproof to prevent identifiable release of hazardous materials to the environment under transportation and storage conditions and meets the requirements of 49 CFR 173.24(f) and 49 CFR 173.24A(A).

**NOTE:** *Identifiable releases are those that can be identified without the use of instruments [49 CFR 173.24(b)(1)].*

20. Wooden boxes
- a. Are described on the approved IWTS container profile and shipment relocation task profile for a given shipment and waste stream by WGS (RCRA Permit).

**4.4.1 Hazardous Waste General  
(continued)**

**NOTE:** *Contact WGS before packaging any waste in wooden boxes to ensure the packages will be acceptable.*

- b. Have all exterior surfaces painted with near white, exterior, fire-retardant paint and have a flame spread rating of 25-75 according to the American Society for Testing and Materials (ASTM) E-84. (Uniform Fire Code Section 8003)

**NOTE:** *Recommended paints and flame test results for each paint are in Evaluation of Fire-Retardant Paints for Use at the INEEL (WM-F1-22-005).*

- 21. The external surfaces of packages are reasonably free of dirt, moisture, and other visible contamination, and the package surface does not exceed 40  $\mu\text{R/hr}$  (RCRA Permit).
- 22. Labels and markings are
  - a. Visible, legibly printed, stenciled, or neatly hand lettered (49 CFR 172.304, RCRA Permit)
  - b. Placed so that one full set of labels and markings for each container is visible for each package during shipment (BMP).
- 23. Marking and labeling for each waste package include
  - a. Properly filled out standard RCRA-regulated hazardous waste marking, as applicable, in accordance with 40 CFR 262.32, including the EPA hazardous waste numbers and the DOT shipping names for the waste (RCRA Permit).
  - b. Phone number of generator contact (BMP) (208) 526-1515.
  - c. Name and address of generating facility [49 CFR 172.301(a), 40 CFR 262.32].
  - d. For manifested shipments, manifest document number (BMP).
  - e. For RCRA hazardous waste, generator's EPA identification number (BMP).
  - f. For PCB transformers and packages containing PCB waste, a standard PCB marking that indicates the INEEL as generator (40 CFR 761.40 and 40 CFR 761.45).
  - g. Waste package gross weight (BMP).

**NOTE:** *For packages containing PCB waste, weight must be in kg.*

- h. Waste stream or material identification number as assigned by WGS (BMP).
- i. Shippers unique container identification number, which may be (RCRA Permit BMP).

**4.4.1 Hazardous Waste General  
(continued)**

(1) A marking in which the first four characters identify the facility, the second two digits identify the current calendar year, and the last four digits are the container number [a new sequence of container numbers (commencing with 0001) is initiated each January 1] i.e., ZYXW-99-0001, or

(2) A barcode number issued by the WGS.

j. All other proper DOT labels and markings required by 49 CFR 172, Subparts D & E

k. No extraneous markings, such as free-hand spray paint markings or graffiti of any kind, are visible on any surface of the package, except for quality inspection stamps and markings required by these RRWAC criteria (RCRA Permit).

**NOTE:** *Extraneous markings may be painted over in lieu of removal by other means.*

24. Bulk shipments are marked and labeled on the bulk packaging as required by 49 CFR 172, Subparts D and E.

25. Waste packages are loaded on the transport vehicle in accordance with 49 CFR 177.848, Segregation of Materials.

26. Palletization conforms to the following requirements:

a. Wooden pallets are constructed of nominal 1-in. minimum dimension lumber with nominal 4-in. vertical spacing for forklift tine entry (RCRA Permit).

b. Pallets are 4 × 4 ft (nominal dimension) (RCRA Permit).

c. Pallets are in new or structurally sound condition, without extensive splits, significant cracks, or crushing (RCRA Permit).

d. Pallets do not show rot or evidence of severe oxidation (RCRA Permit).

e. Pallets are free of mud, clogged dirt, and any residue (RCRA Permit).

f. Packages on pallets are secured to the pallet (RCRA Permit).

g. Packages are secured together for palletized loads of more than one package (BMP).

27. Any specialized rigging required to hoist the shipment.

a. is for a single-point hook connection (BMP).

b. Accompanies and remains with the shipment (BMP)

c. Meets the requirements of and is inspected in accordance with the *DOE Standard Hoisting and Rigging*

#### **4.4.1 Hazardous Waste General (continued)**

- d. Has an inspection date that has been verified as current by the receiving organization (*DOE Standard Hoisting and Rigging*).
28. In addition to the above requirements PCB wastes  $\geq 50$  ppm are packaged in accordance with applicable Toxic Substances Control Act requirements in 40 CFR 761.65. Use of the PCB packaging exemptions in 40 CFR 761.65(c)6 for non liquids or 40 CFR 761.65(c)7 for liquids is to be formally approved by WGS.

#### **4.4.2 Hazardous Waste to Private Sector Facilities**

INEEL Generators may coordinate directly with private sector hazardous waste TSDFs under contract with the INEEL but must obtain the assistance of WGS to ensure acceptance criteria are met in order to ship waste to such facilities. Acceptance criteria information specific to such facilities that are under contract for the INEEL is available from WGS. Requirements of Subsection 4.4.1 must also be met.

#### **4.4.3 Hazardous Waste to be Stored at Hazardous Chemical & Radioactive Waste Storage Facility (HCRWSF CPP-1619)**

In addition to meeting all the criteria in Subsection 4.4.1, the following acceptance criteria shall also be met before shipping and receiving at HCRWSF.

1. No free liquids are packaged, unless packaged as such (BMP).

#### **4.4.4 Hazardous Waste to be Stored at the Waste Experimental Reduction Facility Waste Storage Building or the Mixed Waste Storage Facility**

In addition to meeting all the criteria of Subsections 4.4.1, the following acceptance criteria shall also be met before shipping hazardous waste to the WWSB.

1. Waste characterization meets the requirements of the facility specific Waste Analysis Plan.

#### **4.4.5 Hazardous Waste to be Stored at the Mixed Waste Storage Facility Portable Storage Units**

To minimize any potential, however slight, for an unforeseen generation of additional mixed waste, the use of the MWSF-PSUs to store nonradioactive hazardous waste is discouraged by the DOE Idaho Operations Office. However, in the case of inadequate storage capacity for hazardous waste at other facilities, use of PSUs will be considered for hazardous waste.

In addition to meeting all the criteria of Subsection 4.4.1, the following acceptance criteria shall also be met before shipping hazardous waste to the MWSF PSUs.

1. Waste to be stored in the MWSF PSUs
  - a. Does not contain free liquids (MWSF SAR)
  - b. Is not ignitable (MWSF SAR)
  - c. Is not reactive (MWSF SAR).



## 4.5 Low-Level Waste

### 4.5.1 General

The following acceptance criteria shall apply to all low-level waste (LLW) shipped for storage, treatment, or disposal at either the Idaho National Engineering and Environmental Laboratory (INEEL) Waste Experimental Reduction Facility (WERF) or the Radioactive Waste Management Complex (RWMC). These criteria shall apply in addition to the criteria noted in the appropriate Subsections 4.5.2 through 4.5.10.

1. Waste forecast is current per 2.1.7 [DOE Order 5820.2A Chapter III, 3.g(2)]
2. A completed IWTS Material and Waste Characterization Profile for each waste stream has been approved by WGS (BMP).
3. INEL Waste Tracking System computer-generated Shipment and Relocation Profile (S&RP) or has been completed for each waste package before shipment (DOE Order 5820.2).
4. Nuclear accountability documentation, as applicable, is sent to the special nuclear materials accountability program (ID letter, MC and A Reporting Procedures for Waste Data, dated August 29, 1983, H. R. Martin, Chief Safeguard and Materials Management Branch).

**NOTE:** *Nuclear accountability documents do not accompany waste shipments.*

5. The following documentation accompanies the shipment:
  - a. Properly completed shipping papers (49 CFR 172.202,203,204)
  - b. A properly prepared IWTS Shipment Request and Certification report, as required by WGS or the receiving facility.
6. Waste packages meet the following requirements:
  - a. The exterior of all waste packages are free of ice, snow, and dirt (BMP).
  - b. All waste packages are provided with lifting features if required by the *DOE Standard Hoisting and Rigging*.
  - c. Bulky and heavy waste items that could shift within the container during transport and handling are blocked or braced inside the waste container to minimize shifting (49 CFR 173.24).
  - d. Waste package does not leak radioactive material (49 CFR 173.24, 173.412, 173.475).
7. The waste does not contain
  - a. Pressurized containers that are not vented, drained, crushed, or otherwise reconfigured to prevent pressurization (BMP)

**4.5.1 LLW General  
(continued)**

- b. Radioactive materials in a gaseous state, or in a host medium that will permit the gas to be liberated under ambient temperature cycles ranging from -50° F to 110° F (DOE Order 5820.2A).
  - c. Chelating and complexing agents, except residue material (DOE Order 5820.2A)
  - d. PCBs  $\geq$  50 ppm (40 CFR 761) except for radiologically contaminated
    - (1) PCB bulk product waste (40 CFR 761.62) consisting of
      - (a) Plastics
      - (b) Preformed or molded rubber parts and components
      - (c) Applied dried paints
      - (d) Varnishes, waxes or other similar coatings or sealants
      - (e) Caulking
      - (f) Galbestos
      - (g) Non-liquid building demolition debris
    - (2) Other bulk product waste, sampled in accordance with the protocols set out in subpart O of 40 CFR 761 (start at 40 CFR 761.280) that leaches PCBs at  $<10\mu\text{g/L}$  of water measured using a procedure used to simulate leachate generation.
    - (3) Cleanup wastes [40 CFR 761.61(a) (5) (v)] consisting of non-liquid cleaning materials and personal protective equipment waste at any concentration, including non-porous surfaces and other non-liquid materials such as rags, gloves, booties, other disposable personal protective equipment and similar materials resulting from cleanup activities.
    - (4) WERF incinerable waste, which prohibits PCBs  $\geq$  5 ppm (see Table 4.5.2-4 footnote b) and Idaho Administrative Procedures Act (IDAPA) 16.01.01011,04.
    - (5) Weight fraction of PCBs in waste to be disposed at the RWMC is less than  $8.54\text{E-}03$  [RWMC Safety Analysis Report (SAR)].
  - e. RCRA listed and characteristic waste or materials (DOE Order 5820.2A, Chapter III.2.d)
  - f. Material capable of generating toxic gases, vapors, fumes, or liquids in harmful/toxic quantities [DOE Order 5820.2a, Chapter III.3.e(5)].
  - g. Lead material for shielding or other functional purpose (DOE-ID Policy as documented in ADR-53-86).
8. Waste not greater than class C, as defined in 10 CFR 61 [DOE Order 5820.2A, Chapter III, 3.I(4)].

**4.5.1 LLW General  
(continued)**

9. The waste is not pyrophoric, as defined in 49 CFR 173.124(b)(1); DOT Class 1 (formerly Class A, B, and C) explosive; or unstabilized shock-sensitive reactive, as determined by WGS [RWMC SAR and INEEL RCRA Permit].
10. Classified waste material is declassified, or is reconfigured or packaged to prevent recognition and access, thus removing classification (DOE Order 5820.2A).
11. Waste packages are chemically stable (49 CFR 173.24).
12. Marking and labeling for contact-handled, LLW containers, except incinerator boxes and compactor bags to be shipped to the WERF, include

**NOTE:** *Subsection 4.5.2, Item 3, contains marking criteria for incinerator boxes, and Subsection 4.5.3, Item 1, contains marking criteria for compactor bags to be shipped to the WERF.*

- a. One full set of the information required by this section will be placed on the top and opposite side(s) of each container so that the information for each container is always visible, legibly printed, stenciled, or neatly hand-lettered (BMP).
  - b. For hazardous material shipments correct DOT markings (49 CFR 172, Subpart D) and labels (49 CFR 172, Subpart E).
  - c. Extraneous markings, such as free-hand spray paint or graffiti, are removed or painted over (BMP).
  - d. Waste package gross weight (BMP).
  - e. Shipper's complete name and address (BMP).
  - f. Shippers unique container identification number, which may be (RCRA Permit BMP).
    - (a) A marking in which the first four characters identify the facility, the second two digits identify the current calendar year, and the last four digits are the container number [a new sequence of container numbers (commencing with 0001) is initiated each January 1] i.e., ZYXW-99-0001, or
    - (b) A barcode number issued by the WGS.
  - g. Maximum radiation level at contact and at 1 meter in air (BMP).
13. Removable surface contamination on each waste package does not exceed 200 dpm/100 cm<sup>2</sup> beta gamma and 20 dpm/100 cm<sup>2</sup> alpha (40 CFR 173.443).

**NOTE:** *Lifting rings and other auxiliary lifting devices on the package are permissible, provided they are recessed, offset, or hinged in a manner that will not inhibit stacking.*
  14. Waste packages requiring rigging for crane lifts are prerigged, and are specified on a case-by-case basis (DOE Standard Hoisting and Rigging).

**4.5.1 LLW General  
(continued)**

15. Special hoisting and rigging requirements provided by the waste receiving organization are met (*DOE Standard Hoisting and Rigging*).
16. Radiation levels are verified with calibrated radiation survey instruments (BMP).

**NOTE:** *Radiation levels of waste packages are verified by the receiving organization to agree with those reported by the waste generator at the time of shipment to within the following amounts (BMP):*

- a.  $\pm 100\%$  for reported levels  $\leq 10$  mrem/h
  - b.  $\pm 20\%$  for reported levels  $> 10$  mrem/h.
17. Instruments and equipment, for isotope detection and quantification are appropriate for the respective radionuclides and meet the following applicable standards:
    - a. ASTM Designation E 181-93, Standard General Methods for Detector Calibration and Analysis of Radionuclides.
    - b. ASTM Designation C 1000-90, Standard Test Method for Radiochemical Determination of Uranium Isotopes in Soil by Alpha Spectrometry.
    - c. ASTM Designation C 1001-90, Standard Test Method for Radiochemical Determination of Plutonium in Soil by Alpha Spectroscopy.
    - d. ASTM Designation C 1205-91, Standard Test Method for the Radiochemical Determination of Americium-241 in Soil by Alpha Spectrometry.
    - e. ANSI N42.14-1991, American National Standard Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides.

**4.5.2 Contact-Handled, Low-Level Waste to be Incinerated at the Waste Experimental Reduction Facility**

In addition to meeting all the criteria of Subsection 4.5.1, the following acceptance criteria shall also be met before shipping LLW to the WERF for incineration.

1. Waste does not contain
  - a. Asbestos (BMP)
  - b. Large metal objects (BMP).

**NOTE:** *Small metal objects, such as zippers, snaps, buttons, paper clips, staples, etc., are acceptable.*

2. Isotopes originating from nuclear reactors are analyzed and reported per Table 4.5.2-1. Generator developed scaling factors incorporating analytical methods, may be used when

### 4.5.2 Contact-Handled, LLW to be Incinerated at the WERF (continued)

approved through the generators Waste Certification Program. When scaling factors are used in lieu of the analysis specified in Table 4.5.2-1, the minimum isotope reporting shall be in accordance with WROC-EDF-392.

**Table 4.5.2-1. WROC Radionuclide Reporting Requirements (WROC-EDF-392).**

ISOTOPE	ANALYSIS	REPORTING <sup>2</sup>
H-3 (liquid)	H-3 Analysis or at least specifically accounted for on all liquids	Specifically accounted for or All statistically positive results <sup>3</sup>
All gamma emitters	Gamma spectrometric measurements	All statistically positive results <sup>3</sup>
Sr-90	Isotopic Analysis	All statistically positive results <sup>3</sup>
Ba-137m	Calculation/Scaling	0.935 X Cs-137 <sup>4</sup>
Y-90	Calculation/Scaling	1.0 X Sr-90 <sup>4</sup>
C-14	Calculation/Scaling	0.001 X Co-60 <sup>4</sup>
Ni-63	Calculation/Scaling	1.0 X Co-60 <sup>4</sup>
Ni-59	Calculation/Scaling	0.01 X Co-60 <sup>4</sup>
Fe-55	Calculation/Scaling	1.0 X Co-60 <sup>4</sup>
Pm-147	Calculation/Scaling	2.0 X Cs-137 or Sr-90 which ever is > <sup>4</sup>
All alpha emitters	Gross Alpha Count	All statistically positive results <sup>3</sup>
Identify alpha emitters > 30pCi/g for incinerable and > 100 pCi/g all other	Spectrometric Alpha <sup>1</sup>	All statistically positive results <sup>3</sup> and their significant progeny if listed in Table 4.5.2-2
Hard-to-detect nuclides listed in Table 4.5.2-3	Determine if any of the hard-to-detect nuclides are present.	Report isotopes present $\geq$ the IC values of Table 4.5.2-3
<ol style="list-style-type: none"> <li>1. Spectrometric analysis is not required if alpha activity is &lt; 30 pCi/g for incinerable waste, and <math>\leq</math> 100 pCi/g for all other. It is only necessary to identify enough alpha emitters so that the remaining unidentified isotopes are &lt; 30 pCi/g for incinerable waste and <math>\leq</math> 100 pCi/g for all other waste. Certain alpha emitting parents may be calculated if the concentration of their progeny has been determined by other means such as gamma spectrometric measurements. Example, after three years of decay, Pu-241 would be present at a concentration 193 times the concentration of Am-241, which is easily determined by gamma spectrometric measurement.</li> <li>2. Concentrations below the limits specified need not be reported unless required by 49 CFR 173.433</li> <li>3. All radioanalytical results that are statistically positive at the 95% confidence level and above the sample specific minimum detectable activity concentrations.</li> <li>4. Other scaling factors may be used if an appropriate technical basis is provided.</li> </ol>		

**4.5.2 Contact-Handled, LLW to be Incinerated at the WERF  
(continued)**

**Table 4.5.2-2. Alpha Emitting Isotope Significant Progeny.**

Parent Isotope	Significant Progeny Isotope	Reporting
Am-243	Np-239	1.0 X Am-243 Ci. Value
Np-237	Pa-233	1.0 X Np-237 Ci. Value
U-235 (3 progeny)	Th-231	1.0 X U-235 Ci. Value
	Pa-231	0.001 X U-235 Ci. Value
	Ac-227	0.001 X U-235 Ci. Value
U-238 (3 progeny)	Th-234	1.0 X U-238 Ci. Value
	Pa-234	0.0016 X U-238 Ci. Value
	Pa-234m	1.0 X U-238 Ci. Value

**Table 4.5.2-3. Hard to Detect Radionuclides and Insignificant Concentrations (IC).**

Isotope	IC <sup>1</sup> Ci/g	Isotope	IC <sup>1</sup> Ci/g	Isotope	IC <sup>1</sup> Ci/g
Ar-39	8.81E-09	Hf-172	4.14E-10	Si-32	2.29E-10
As-73	2.38E-08	Hg-194	5.11E-11	Sm-145	1.59E-08
Au-195	1.41E-08	I-125	1.23E-13	Sn-113	5.73E-09
Be-10	4.58E-10	La-137	2.73E-09	Ta-179	4.14E-08
Ca-41	7.05E-09	Lu-174m	5.73E-09	Tb-157	1.41E-08
Ca-45	4.85E-09	Mn-53	1.32E-07	Tc-97	7.84E-08
Cd-109	7.93E-10	Os-194	3.61E-10	Tc-97m	1.50E-08
Cd-113m	5.11E-11	P-32	2.64E-09	Te-123m	1.76E-09
Cl-36	1.50E-09	Pb-202	2.64E-10	Tl-204	5.29E-09
Dy-159	1.06E-08	Pb-205	1.06E-08	Ti-44	2.73E-10
Fe-60	7.84E-11	Pm-145	8.81E-09	Tm-170	2.29E-09
Gd-148	3.61E-11	Pt-193	1.06E-07	Tm-171	1.41E-08
Gd-152	4.58E-13	Re-187	1.50E-06	V-49	1.94E-07
Ge-68	4.41E-09	S-35	1.72E-08	W-181	5.73E-08

1. Concentrations below the limits of Tables 4.5.2-1, 4.5.2-2 and 4.5.2-3 need not be reported unless required by 49 CFR 173.433.

**NOTE:** *This reporting guidance is not to be misconstrued as a definition of nonradioactive or as unrestricted release limits.*

3. Incinerator boxes are marked with
  - a. Waste package gross weight (BMP)
  - b. Maximum radiation level at contact (BMP)
  - c. Generating facility identification (49 CFR 172, Subpart D).

**4.5.2 Contact-Handled, LLW to be Incinerated at the WERF  
(continued)**

4. Glass and fiberglass are considered for acceptance on a case-by-case basis (BMP).
5. Halogenated compound wastes are accepted on a case-by-case basis (BMP; Federal Register, June 1, 1990, p. 22534; and 40 CFR 268, Appendix III).
6. Containers are in as-new condition (49 CFR 173.24) and are not wetted or excessively weathered (BMP).
7. Bulk wood waste materials (shoring, temporary containment, scaffolding) that can be sized for incineration are packaged in DOT 7A Type A decontamination and decommissioning bins or 4 × 4 × 8-ft wooden waste boxes (BMP).
8. Palletized cardboard boxes of incinerable waste are secured to each other and the pallet with pallet wrap (Gem State Paper MPN 586018 or equivalent) (BMP).
9. Waste is packaged in an incinerable box (solids only), 20 × 20 × 20 in., or 2 × 2 × 2 ft (WERF SAR).
10. Waste packages comply with requirements of Table 4.5.2-4.

4.5.2 Contact-Handled, LLW to be Incinerated at the WERF  
(continued)

Table 4.5.2-4. WERF Incinerable Waste.

Characteristic	Incinerable Liquids	Incinerable Box (Solids Only)	Criterion Basis
Gross weight	≤ 800 lbs/drum	≤ 60 lb/box	(Design)
Dimension	55 gallon	≤ 2 × 2 × 2 ft, overfill swelling not included	(BMP)
Radiation limit	≤ 20 mR/h at contact	≤ 20 mR/h at contact	(BMP)
Fissionable material	Contact the WGS before shipping any fissionable material	Contact the WGS before shipping any fissionable material	(WERF SAR)
TRU material limit	TRU (alpha) < 0.1 nCi/g	TRU (alpha) < 0.1 nCi/g	(BMP)
Liner <sup>a</sup>	NA	4 mil (minimum)	(BMP)
Closure	No leakage	Twist and tape neck, tape box, no leakage	(49 CFR 173.24) (BMP)
Viscosity	≤ 50 SSU	NA	(BMP)
Soil content	< 1% of waste weight	< 1% of waste weight	(BMP)
PCB content	< 5 ppm <sup>b</sup>	< 5 ppm <sup>b</sup>	(IDAPA 16.01.01011, 04)
Absorbed liquid	NA	Must be absorbed with twice the manufacturer's recommended quantity of absorbent to absorb all the liquid	(BMP)
Absorbed aqueous liquid	NA	< 16.4 lb/box	(BMP)
Ash content	No limit, must be identified	No limit, must be identified	(BMP)
Aqueous waste	> 70% water	NA	(BMP)
Heating value	≥ 45,000 BTU/lb	≥ 15,000 BTU/lb <del>No limit, must be identified.</del>	(BMP)
Sulfur content	No limit, must be identified	No limit, must be identified	(BMP)

a. Box liners are not required for waste in 4-mil (minimum) bags. The bags can be necked, tape sealed, and put directly in the boxes if the exterior of the bag is free from contamination and damage (BMP).

b. Waste with a PCB content >5 ppm but <50 ppm can be incinerated at WERF if it is blended" with other waste, such that the waste actually fed into the incinerator is < 5 ppm.



#### 4.5.3 Contact-Handled, Low-Level Waste to be Compacted at the Waste Experimental Reduction Facility

In addition to meeting all the criteria of Subsection 4.5.1, the following acceptance criteria shall also be met before shipping contact-handled LLW to the WERF for compaction.

1. Compactor bags, except bags placed into compactor bins for transport to WERF, are marked with
  - a. Waste package gross weight (BMP)
  - b. Maximum radiation level at contact (49 CFR 172.403)
  - c. Generating facility identification (49 CFR 172, Subpart D).
2. Waste bags are transported in one of the following:
  - a. WERF Waste Cargo Container (BMP)
  - b. Compactor Bins, WGS approval is required on this option (BMP).
3. Waste does not contain (BMP):
  - a. Asbestos
  - b. Radionuclides in concentrations that exceed the RWMC PA limits detailed in Section 4.5.5.
4. Isotopes originating from INEEL nuclear reactors or similar, are reported per Table 4.5.2.1 or approved equivalent process incorporating analytical methods and scaling factor approved through the generators Waste Certification Program. Other sources of radionuclides are handled on a case-by-case basis.

**NOTE:** *This reporting guidance is not to be misconstrued as a definition of nonradioactive or unrestricted release limits.*

5. Waste packages comply with requirements of Table 4.5.3-1.

### 4.5.3 Contact-Handled, LLW to be Compacted at the WERF (continued)

**Table 4.5.3-1. WERF Compactible Waste.**

Characteristic	Poly Bag <sup>a</sup>	Compactor Bin	Cargo Container	Criterion Basis
Gross weight <sup>b</sup>	≤ 60 lb/bag	≤ 6,000 lb/bin	≤ 13,000 lb/container	
Dimension <sup>b</sup>	≤ 30 × 40 × 66 in.	4 × 4 × 6 ft	8 × 8 × 20 ft	(BMP)
Radiation	≤ 200 mR/h at contact/bag	≤ 200 mR/h at 1 m	≤ 200 mR/h at 1 m	(BMP)
TRU content	TRU (alpha) < 10 nCi/g	TRU (alpha) < 10 nCi/g	TRU (alpha) < 10 nCi/g	(BMP)
Fissionable material	Contact WGS before shipping any fissionable material	Contact WGS before shipping any fissionable material	Contact WGS before shipping any fissionable material	(WERF SAR)

a. The minimum packaging for compactible waste is tape sealed 4-mil polyethylene sleeving, bags, or sheets. Items that may puncture or rip the containment are padded to eliminate sharp projections. Items contaminated to levels greater than 10,000 dpm/100 cm<sup>2</sup> require double containment (BMP).

b. Contact WGS about any waste material that is considered to be compactible but may not meet the dimensional or weight limits. Compactor Bins are available to waste generators for packaging and transportation of these wastes (BMP).

### 4.5.4 Contact-Handled, Low-Level Waste to be Sized at the Waste Experimental Reduction Facility

In addition to meeting all the criteria of Subsection 4.5.1, the following acceptance criteria shall also be met before shipping contact-handled LLW to the WERF for sizing.

1. Items prohibited from sizing at the WERF:
  - a. Any form of electrical or thermal insulation (BMP)
  - b. Metals and wood in the same container (BMP)

**NOTE:** *Incidental metals such as nails, hinges, and hasps are acceptable.*

  - c. Asbestos (BMP).
2. Metal waste allowed is stainless or carbon steels, aluminum, copper, or copper alloys.
3. All pipes and vessel interiors are free of liquids and hazardous or toxic materials (BMP).
4. Loose surface contamination on items to be sized is contained by wrapping each item individually in polyethylene or covering pipe ends with tape or polyethylene (BMP).

#### 4.5.4 Contact-Handled, LLW to be Sized at the WERF (continued)

**NOTE:** *Polyethylene equivalents are acceptable; PVC is not used.*

5. Waste packages have a waterproof cover and inside wrappings that are sealed on the side or bottom (BMP).
6. Isotopes originating from INEEL nuclear reactors or similar, are reported per Table 4.5.2.1 or approved equivalent process incorporating analytical methods and scaling factor approved through the generators Waste Certification Program. Other sources of radionuclides are handled on a case-by-case basis.

**NOTE:** *This reporting guidance is not to be misconstrued as a definition of nonradioactive or unrestricted release limits.*

7. Waste does not contain radionuclides in concentrations that exceed the RWMC PA limits as detailed in Section 4.4.5.
8. Waste packages comply with the requirements of Table 4.5.4-1

**Table 4.5.4-1. WERF Sizing Waste.**

Characteristic	DOT 7A Type A D&D Bin <sup>a</sup>	Approved Packaging <sup>b</sup>	Criterion Basis
Gross weight <sup>c</sup>	≤ 10,000 lb/bin	Negotiate with WGS	
Dimension (nominal)	78 in. wide × 48 in. high × 114 in. long	Negotiate with WGS	
Fissionable material	Contact WGS before shipping any fissionable material	Contact WGS before shipping any fissionable material	(WERF SAR)
TRU content	TRU (alpha) < 0.5 nCi/g or 250 dpm/100cm <sup>2</sup>	TRU (alpha) < 0.5 nCi/g or 250 dpm/100 cm <sup>2</sup>	(BMP)
Radiation <sup>d</sup>	< 100 mR/h at contact	< 100 mR/h at contact	(BMP)
Liner	Optional - if no liner, cover bottom with blotter paper	8-mil yellow poly, taped closed	(BMP)

a. Decontamination and decommissioning (D&D) bins may be obtained from the WERF for use by INEEL waste generators as needed.

b. It is the shipper's responsibility to determine that a package meets the requirements of DOT 49 CFR 173.24 to qualify as a strong tight package.

c. Gross weight limits are based on standard container designs (Design).

d. Waste with hot spots greater than 100 mR/h may be processable at the WERF if approved by WGS (BMP).

#### 4.5.5 Contact-Handled, Low-Level Waste to be Disposed of at the Radioactive Waste Management Complex

In addition to meeting all of the criteria of Subsection 4.5.1, the following acceptance criteria shall also be met before shipping contact-handled LLW to the RWMC for disposal.

1. Waste does not contain
  - a. Waste that can be cost effectively processed [DOE Order 5820.2A, Chapter III.f(2)]
  - b. Waste that can be cost effectively volume-reduced by the generator [DOE Order 5820.2A, Chapter III.f(2)]
  - c. Free liquid [DOE Order 5820.2A, Chapter III.3.i(5)(b)]
  - d. Municipal solid waste [40CFR 257.1(c)(10)].
2. Radionuclides in the waste volume do not exceed concentration limits for class C waste as defined in Tables 1 and 2 of 10 CFR 61.55, including associated Branch Technical position papers. [DOE Order 5820.2A, Chapter III, 3.i(4); Joel T. Case letter to F. P. Hughes; Radioactive Waste Management Complex (RWMC) Low Level Waste Classification Methodology, OPE/WMPO-95-289, dated October 23, 1995].
3. Waste exceeding the limits stated in Item 2 above will require a case-by-case evaluation (Performance Assessment) and approval from DOE-HQ prior to disposition as low-level waste (LLW), transuranic (TRU) waste, or special case waste (SCW) [DOE Order 5820.2A, Chapter III, 3.i(4)].
4. Radionuclide concentration limits for the waste volume in each waste package as listed in Table 4.5.5-1 are not exceeded i.e., sum of the fractions is  $<1$  (RWMC PA EG&G-WM-8773, May 1994).
5. Waste exceeding the limits stated in Item 4 above will require a case-by-case evaluation (Performance Assessment) and approval from the RWMC facility manager prior to disposition as low-level (LLW), transuranic (TRU), or special case waste (SCW) [DOE Order 5820.2A, Chapter III, 3.i(4)].
6. Radioisotope concentration values of hard-to-measure radionuclides (C-14, I-129, Tc-99, and Nb-94) have been derived from scaling factors included in the WCP [Joel T. Case letter to F. P. Hughes, Radioactive Waste Management Complex (RWMC) Low Level Waste Classification Methodology, OPE/WMPO-95-289, dated October 23, 1995].
7. Scaling factors were developed, validated, and implemented before the first shipment to RWMC and are periodically confirmed through direct measurements [Joel T. Case letter to F. P. Hughes, Radioactive Waste Management Complex (RWMC) Low Level Waste Classification methodology - (OPE/WMPO-95-289) dated October 23, 1995].

4.5.5 Contact-Handled, LLW to be Disposed of at the RWMC  
(continued)**Table 4.5.5-1.** Performance Assessment Waste Volume Concentration Limits for LLW Disposal.

Radionuclide	Waste Volume Concentration Limit in Ci/m <sup>3</sup>		
	Vault	Pit	Lower Reporting Limit <sup>b</sup>
Be-10	14	14	.014
C-14	8	8	.0008
C-14 (in activated metals)	80	80	.008
Cm-242	3700 nCi/g	3700 nCi/g	20 nCi/g
Co-60	166,000	83,000	7
Cs-137	16	8	.01
H-3	40 <sup>a</sup>	40 <sup>a</sup>	.4
I-129	0.08	0.08	.00008
Nb-94 (in activated metals)	0.2	0.2	.0002
Ni-59 (in activated metals)	220 <sup>a</sup>	180	.18
Ni-63	3,300	3,300	.035
Ni-63 (in activated metals)	3,300	3,300	.035
Pu-241	250 nCi/g	250 nCi/g	.25 nCi/g
Sr-90	24	12	.0004
Tc-99	3	3	.0003
TRU (except Pu-241, Cm-242)	10 nCi/g	10 nCi/g	.1 nCi/g
U-233	0.015	0.015	.00015
U-234	0.035	0.035	.00035
U-235	0.015	0.015	.00015
U-238	0.04	0.04	.004
a. Limit listed is the NRC Class A Limit. Requests for increased concentration levels will be considered on a case-by-case basis.			
b. Otherwise, radionuclides should be listed on shipment manifests and data bases in compliance with 49 CFR 173.433			

8. Nuclide reporting requirements for waste being sent to the RWMC for disposal are as follows [DOE Order 5820.2A, Chapter III, 3.I(4)]:

**NOTE:** *This reporting guidance is not to be misconstrued as a definition of nonradioactive or unrestricted release limits.*

- a. Radionuclides listed in Table 4.5.5.1 are reported when values meet or exceed the lower reporting limit, or per 49 CFR 173.433 which ever is least.
- b. Radionuclide's with half lives of less than 5 yr, except for CM-242, are reported when their concentrations are greater than 7 $\mu$ Ci/ cm<sup>3</sup> of waste.

**4.5.5 Contact-Handled, LLW to be Disposed of at the RWMC  
(continued)**

- c. When the activity of any radionuclide not identified in 8.a and b above comprise greater than 1 percent of the total activity in the waste form.
  - d. For the waste package containing a mixture of radionuclides listed in Table 4.5.5-1, a sum of the fractions has been performed by dividing each nuclide's concentration by the appropriate limit for that nuclide, and adding the resulting values for all nuclides. Waste packages with sum of the fractions < 1 are disposed.
  - e. Daughter products in secular equilibrium with the parent radionuclide are not reported. Report only the curie value of the parent radionuclide. For the purposes of this criterion, daughter products in secular equilibrium will include only those radionuclides that have half-lives equal to or less than 10 days and equal to or less than their parent radionuclide. This is consistent with 49 CFR 173.433.
9. Based on the conditionally approved radiological Performance Assessment for the disposal facility at RWMC, disposal of C-14 at this time is limited to:
- a. 0.5 Ci per year total in waste forms other than activated metals
  - b. 2.0 Ci per year total in activated metals
- Disposal of waste that will cause these limits to be exceeded will require approval from the RWMC Facility Manager.
10. Absorbents and stabilizing agents used to eliminate free liquids, per DOE Order 5820.2A, have undergone the generator's bench-scale testing that demonstrates that
- a. Performance is as specified by the vendor or that an improved specific-use methodology has been developed (BMP).
  - b. Liquids do not separate from the absorbents or stabilizing agents due to ambient temperature cycles ranging from -50°F to 110°F (WGS-EDF-005).
11. Dry-loaded waste packages such as drums, boxes, or inserts having a potential for free liquid have
- a. An optimum absorbent or stabilizing agent (as determined in 10 above) used to ensure immobilization of free liquid (BMP)
  - b. An absorbent or stabilizing agents placed inside the innermost waste bag or container where the free liquid is suspect (BMP)
  - c. Absorbents and stabilizing agents placed as close as practical to inaccessible liquid (BMP).
12. Wastes generated or packaged underwater
- a. Contain as little free liquid as possible, not to exceed 1% of the waste volume [DOE Order 5820.2A, Chapter III.i(5)(b)]
  - b. Has container openings closed with no leakage (49 CFR 173.24, 173.412, 173.475)

#### 4.5.5 Contact-Handled, LLW to be Disposed of at the RWMC (continued)

- c. With the potential for free liquids in the cask or waste package are noted as such on the shipping papers (DOE Order 5820.2A).
- 13. Tritium waste has been prepared for disposal to prevent exceeding an equivalent package release rate of 40 Ci/m<sup>3</sup>/y. [DOE Order 5820.2A, Chapter III, 3, a, b, and i(4)].
- 14. Radioactively contaminated soil offered for disposal has been assessed against the following prescribed alternate soil management options:
  - a. Soil will be accepted for disposal with concurrence of WGS the Environmental Restoration Program, Soil Restoration Department (ER/SR) and the RWMC (BMP)
  - b. Radioactively contaminated soil to be disposed at the RWMC has been used to fill interstitial voids in visually apparent filled waste packages. Use of this option requires the generator to provide a utilization plan and written approval of WGS (BMP)
  - c. Radioactively contaminated soil posing a radiation hazard in the generating facility will be considered for disposal on a case-by-case basis after ER/SR and RWMC consideration (BMP).
- 15. Void volume within the waste and between the waste and its packaging is reduced as much as practicable (DOE Order 5820.2A).
- 16. Low-level waste resulting from treated mixed waste (40 CFR 268)
  - a. Does not exhibit characteristic hazards
  - b. Meets all applicable Land Disposal Restriction (LDR) waste treatment standards
  - c. Is documented appropriately with necessary LDR notifications and certifications placed in the INEEL operating records and sent to the State of Idaho (one time notifications for each distinct waste stream).
- 17. Waste package exterior surfaces
  - a. Wooden boxes are painted with near white, exterior, fire-retardant paint approximately 0.007-in. thick, and have a flame-spread rating of 25 to 75 per American Society for Testing and Materials (ASTM) E-84. (Uniform Fine Code Section 8003.13)  
  
**NOTE:** *Recommended paints and flame test results for each paint are in Evaluation of Fire-Retardant Paints for Use at the INEEL (WM-F1-22-005).*
  - b. Of all other packages are painted or coated with material that enhances the package lifetime and decontaminability (BMP).
- 18. Fissile material concentration does not exceed the fissile material threshold value concentrations listed in Table 4.5.5-2. (RWMC SAR)
- 19. Waste matrix group assignments are determined by the RWMC. Contact WGS for assistance (RWMC SAR).

#### 4.5.5 Contact-Handled, LLW to be Disposed of at the RWMC (continued)

20. Waste exceeding the limits stated in Table 4.5.5-2 will require a case-by-case evaluation and approval from the RWMC facility manager prior to disposition (RWMC SAR).
21. Packages for LLW pass the 49 CFR 173.475 quality control inspection requirements to qualify for shipment.
22. Standard containers for LLW are any of the following: (BMP)
  - a. DOT authorized drums as follows:
    - (1) 55-gal drum
    - (2) 30-gal drum
    - (3) 71-gal square drum
  - b. 6M Shipping Packages (ES-51526).
  - c. ANL-E, DOT 7A Type A Steel Bin
  - d. INEEL wooden boxes
  - e. WERF Compactor Bin
  - f. M-III Bin
  - g. Mark III DOT 7A Type A Concrete Box
  - h. DOT 7A Type A Steel Boxes
  - i. Argonne National Laboratory - West (ANL-W) and TRA Shielded Hot Air Evaporator Drums
  - j. DOT and DOE-ID SCO/LSA non-accident resistant packages.
23. Waste packages comply with requirements of Table 4.5.5-3.

**Table 4.5.5-2. Fissile Material Waste Matrix Groups (RWMC SAR).**

Waste Matrix Group	Polyethylene	Cellulose	Metal(Al) <sup>a</sup>	Concrete	Brick	Glass/Slag	Graphite	Salt
TVC <sup>b,c,d</sup>	g/lb g/kg	3.10 6.82	1.30 2.86	0.82 1.8	0.38 0.84	0.23 0.51	0.09 0.20	0.02 0.04
TVC <sup>d</sup> U-233	g/lb g/kg	4.98 11.0	2.16 4.75	0.38 0.84	0.62 1.36	0.34 0.75	0.15 0.33	4.27 9.39
a. To be conservative the threshold value for metal is calculated on aluminum. b. Threshold value concentration (TVC). c. For all fissile radioisotopes except U-233. d. Fissile limit for each waste package is 380 grams.								



4.5.5 Contact-Handled, LLW to be Disposed of at the RWMC  
(continued)**Table 4.5.5-3.** Contact-Handled, Low-Level Waste to be Disposed of at the RWMC.

Characteristic	DOT Steel Drum	INEEL Wooden Boxes <sup>a</sup>	Criterion Basis
Gross weight	DOT limit or $\leq$ 20-lb/gal <sup>b</sup>	$\leq$ 12,000 lb/box	(BMP)
Dimension	5-gal minimum 55-gal (1,000 lb max.) 71-gal preferred	4 × 4 × 4 ft 2 × 4 × 8 ft 4 × 4 × 8 ft (soils prohibited) <sup>c</sup>	(BMP)
Radiation limit	< 500 mR/h at 1 m	< 500 mR/h at 1 m	(BMP)
Fissionable material <sup>d</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Liner (minimum) <sup>f, g</sup>	N/A	3-ply reinforced plastic <sup>h</sup>	(BMP)
Lid gasket <sup>i</sup>	Secured	Secured	(49 CFR 173.24)
Characteristic	DOT 7A Type A Steel Box	M-III Bin <sup>k</sup>	Criterion Basis
Gross weight	$\leq$ 12,000 lb	$\leq$ 8,000 lb/bin	(Design)
Dimensions	4 × 4 × 6, 7, or 8 ft	4 × 5 × 6 ft	(Design)
Radiation limit	< 500 mR/h at 1 m	< 500 mR/h at 1 m	(BMP)
Fissionable material <sup>d</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Liner (minimum)	N/A	N/A	(BMP)
Lid gasket	Mfg. Installed	Neoprene gasket <sup>i</sup>	(49 CFR 173.24)
Characteristic	DOT 7A Type A Mark III Concrete Box <sup>l</sup>	DOT or DOE-ID Non-accident Resistant Package <sup>j</sup>	Criteria Basis
Gross weight	$\leq$ 21,800 lb/box	TBD	(Design)
Dimensions	4 × 4 × 8 ft	TBD	(Design)
Radiation limit	< 500 mR/h at 1 m	< 500 mR/h at 1 m	(BMP)
Fissionable material <sup>d</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Liner (minimum)	N/A	N/A	(BMP)
Lid gasket	By design	N/A	(49 CFR 173.24)

a. Maximum-loaded gross weight, uniformly distributed, for the INEEL wooden boxes is 12,000 lb (EDF-541, INEEL Wooden Waste Box Capacity Upgrade, May 6, 1992). These boxes are banded with 3/4-in. steel banding material. As a minimum, five bands are used. Three horizontal bands are used (RWMC drawings 410206 and 410205) and during closure two vertical bands are applied, one-third the length of the box from each end. These boxes are available from the LMITCO Warehouse. The generator provides sufficient blocking to keep heavy items in place and to distribute the load uniformly within the container. To help ensure box integrity is maintained during transit, a minimum of 90% of each box skid is in contact with the truck/trailer deck. Waste material is LSA/SCO and is  $\leq$  DOT A<sub>2</sub> quantity.

- b. DOT limit for a UN 1A2 55-gal drum is 1,000 lb, and a UN 1A2 71-gal square drum is 1,300 lb. The 20-lb/gal limit for the 55- and 71-gal drums qualifies for a DOT strong, tight container. This limit is permitted because the drums passed the DOT 7A drop test at that loaded weight.
- c. LLW soils are not disposed of in 4 × 4 × 8-ft boxes, unless the soil has been immobilized, except when in smaller packages or when used as a filler to achieve volumetric efficiency. Contact WGS of soil packaging.
- d. Fissionable material limits are based on assumed low-density waste contaminated with small amounts of volumetric averaged fissionable material. Low-density waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping. Volumetric average is defined as concentration obtained by dividing the total fissionable material content of a container by its volume.
- e. Wrapping of individual waste items in one 8-mil yellow polyethylene is an equivalent liner.
- f. A damaged liner shall be repaired or replaced.
- g. Liner is a 3-ply linear low density polyethylene copolymer and nylon yarn laminate. (ES-50338, ES-50339, ES-50340).
- h. Container lids are secured to ensure contamination control through all phases of handling and transportation.
- i. The lid is secured using 8-penny, cement-coated nails, 1-1/2-in. staples, or 1-1/2-in. grabber screws on 12-in. centers. Screws are rotated into place with either a manual or automatic screw driver. Screws are not nailed into place using a manual or automatic hammer. Once used, screws are not reused. Screws are not used in an existing nail or screw hole.
- j. (deleted)
- k. A Neoprene gasket (1-3/4 in. wide × 1/4 in. thick) is bonded to the lid and body using nonhardening gasket sealer. The lid is secured with 5/16-in. hexhead screws in combination with 16-gauge galvanized washers with an 1/8-in. thick neoprene material, heat- and pressure-bonded to the underside of the washer.
- l. This container is designed specifically for underwater loading. Contents for loading are preplanned and submersion time of the container is minimized. Before development of this container, water pit and canal generated contact-handled waste, by necessity, has been disposed of as remote-handled waste. Availability of this container requires the waste generator to segregate underwater-generated, contact-handled waste from remote-handled waste, and dispose of it accordingly.

#### **4.5.6 Remote-Handled, Low-Level Waste to be Disposed of at the Radioactive Waste Management Complex**

In addition to meeting the criteria of Subsection 4.5.1 and 4.5.5, excepting radiation limits and authorized containers, the following acceptance criteria shall also be met before shipping remote-handled LLW to the RWMC for disposal.

1. Remote-handled waste container labels are permanently affixed container identification number located on the container top, and visible and legible through remote visual verification equipment. This number is directly traceable to an IWTS Shipment and Relocation Profile.
2. Standard containers for remote-handled LLW are any of the following: (BMP)
  - a. RWMC 55-ton insert
  - b. Test Reactor Area (TRA) resin system (commercial)
  - c. Mark III DOT 7A Type A Concrete Box

**4.5.6 Remote-Handled, LLW to be Disposed of at the RWMC  
(continued)**

- d. HFEF-5 Waste Canister
  - e. Other
    - (1) ANL-W 55-gal crimp-head drum
    - (2) Nuclear Reactor Facility (NRF) and Test Reactor Area (TRA) concrete vaults
    - (3) NRF-A1W sealed resin columns waste package
    - (4) NRF Expended Core Facility Water Pit Demineralizer Type V Tank Assembly
    - (5) Remote Analytical Laboratory (RAL) 30-gal insert
    - (6) 6M Shipping Packages (ES-51526).
3. Waste packages comply with requirements of Table 4.5.6-1.

4.5.6 Remote-Handled, LLW to be Disposed of at the RWMC  
(continued)**Table 4.5.6-1.** Remote-Handled, Low-Level Waste to be Disposed of at the RWMC.

Characteristic	55-ton Insert	TRA Resin System	Criterion Basis
Gross weight	≤ 12,000 lb/insert	≤ 20,000 lb/package	(Design/NRC License)
Dimension	4 ft dia × 8 ft	6 ft dia × 7 ft	(Design)
Radiation limit <sup>c</sup>	> 500 mR/h at 1 m	> 500 mR/h at 1 m	(RWMC)
Fissionable material <sup>b</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Characteristic	Mark III Concrete Box <sup>c</sup>	HFEF-5 Canister	Criterion Basis
Gross weight	≤ 21,800 lb/box	≤ 1,000 lb/canister	(Design)
Dimension	4 × 4 × 8 ft		(BMP)
Radiation limit	≥ 500 mR/h at 1 m	> 500 mR/h at 1 m	(BMP)
Fissionable material <sup>b</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Lid gasket	By design	Seal welded or bolted with Viton™ seal, no leakage	(RWMC EDF)
Characteristic	Other		Criterion Basis
Gross weight	Package design limit		(Design)
Radiation limit <sup>a</sup>	> 500 mR/h at 1 m		(BMP)
Fissionable material <sup>b</sup>	See Table 4.5.5-2		(RWMC SAR)
Lid gasket	Container design		(Design)

a. The radiation level of the package is ≥ 500 mR/h at 1 meter to qualify as remote-handled waste. An upper limit has not been defined.

b. Fissionable material limits are based on assumed low-density waste contaminated with small amounts of volumetric averaged fissionable material. Low-density waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping. Volumetric average is defined as concentrations obtained by dividing the total fissionable material content of a container by its volume.

c. One purpose of the box is to allow packaging of underwater-generated waste and lower-exposure rate, remote-handled waste in a manner that will allow the waste to be managed as contact-handled.

#### **4.5.7 Contact-Handled, Special Case Low-Level Waste to be Stored at the Radioactive Waste Management Complex**

In addition to meeting all the criteria of Subsection 4.5.5, the following acceptance criteria shall also be met before shipping contact-handled, special case LLW to the RWMC for storage.

Waste in this category exceeds the classification limits for Class C waste and/or the concentration limits in Table 4.5.5-1.

1. Approval to store contact-handled, special case LLW at the RWMC is obtained from the RWMC Program Manager [BMP, DOE Order 5820.2A, Chapter III, 3, a, b, and i(4), RWMC SAR].
2. Packages for special case LLW pass the 49 CFR 173.475 quality control inspection requirements to qualify for shipment.
3. Packages of special case LLW are labeled "SCW" on the top and side.
4. Standard containers for contact-handled, special case LLW to be stored at the RWMC are as follows: (BMP)
  - a. DOT or UN 1A2 55-gal drum
  - b. 6M Shipping Packages (ES-51526).
  - c. Mark III DOT 7A Type A Concrete Box
  - d. DOT 7A Type A steel boxes.
5. Waste packages comply with the requirements of Table 4.5.7-1.

**4.5.7 Contact-Handled, Special Case LLW to be Stored at the RWMC**  
(continued)

**Table 4.5.7-1. Contact-Handled, Special Case Low-Level Waste to be Stored at the RWMC.**

Characteristic	DOT Steel Drum	DOT Steel Boxes	Criterion Basis
Gross weight	DOT limit or ≤ 20-lb/gal <sup>a</sup> 1,000 lb max.	≤ 12,000 lb/box	(Design)
Dimension	55-gal preferred	4 × 4 × 6, 7, and 8 ft	(BMP)
Radiation limit	< 200 mR/h at contact	< 200 mR/h at contact	(BMP)
Fissionable material <sup>b</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Liner	55-gal, 90 mil, rigid poly, <sup>c</sup> or UN 1A2 drum, DOT 2R container	NA	(BMP)
Lid gasket	Secured	Mfg. installed	(49 CFR 173.24)
Characteristic	Mark III Concrete Box		Criterion Basis
Gross weight	≤ 21,800 lb/box		(Design)
Dimensions	4 × 4 × 8 ft		(Design)
Radiation limit	< 200 mR/h at contact		(BMP)
Fissionable material <sup>b</sup>	See Table 4.5.5-2		(RWMC SAR)
Liner	N/A		(BMP)
Lid gasket <sup>d</sup>	By design		(BMP)

a. The DOT limit for a UN 1A2 55-gal drum is 1,000 lb and a UN 1A2 71-gal square drum is 1,300 lb. The 20-lb/gal limit, for the 55- and 71-gal drums, qualifies for a DOT strong, tight container. This limit is permitted because the drums passed the DOT 7A drop test at that loaded weight.

b. Fissionable material limits are based on assumed low-density waste contaminated with small amounts of volumetric averaged fissionable material. Low-density waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping etc. Volumetric average is defined as concentration obtained by dividing the total fissionable material content of a container by its volume.

c. A rigid polyethylene liner (procurement specification ES-50357) is used inside the UN 1A2 drum.

d. All container lids shall be secured to ensure contamination control through all phases of handling and transportation.

#### 4.5.8 Remote-Handled, Special Case Low-Level Waste to be Stored at the Radioactive Waste Management Complex

In addition to meeting all the criteria of Subsections 4.5.6 and 4.5.7, the following acceptance criteria shall also be met before shipping remote-handled, special case LLW to the RWMC for storage.

1. Standard containers for remote-handled, special case LLW to be stored at the RWMC are as follows:
  - a. DOT drum, 30-gal
  - b. DOT drum, 55-gal
  - c. 6M Shipping Packages (ES-51526).
  - d. ANL-W Hot Fuel Examination Facility (HFEF)-5 Canister.
2. Waste packages comply with the requirements of Table 4.5.8-1.

**Table 4.5.8-1.** Remote-Handled, Special Case Low-Level Waste to be Stored at the RWMC.

Characteristic	DOT 30-gal Drum	HFEF-5 Canister	Criterion Basis
Gross weight	$\leq 400$ lb/drum <sup>a</sup>	$\leq 1,000$ lb canister	(Design)
Dimension	30-gal drum	12.375 in. dia $\times$ 74.5 in. high	(Design)
Radiation at surface <sup>b</sup>	$> 200$ mR/h $\leq 30$ R/h	$> 200$ mR/h $< 1,000$ R/h	(BMP) (RWMC SAR)
Fissionable material <sup>c</sup>	See Table 4.5.5-2	See Table 4.5.5-2	(RWMC SAR)
Thermal power <sup>d</sup>	$\leq 300$ w/drum	$\leq 300$ w/canister	(BMP)
Inner container	Sealed metal or poly containers <sup>e</sup>	14-gauge stainless steel	(BMP)
Liner	Poly blow molded <sup>f</sup>	N/A	(BMP)
Tamper indicating device (TID)	Yes	Seal welded or eutectic metal poured over headclamp	[49 CFR 173.412(b)]
Lid gasket <sup>g</sup>	Yes <sup>g</sup>	Seal welded or bolted with Viton Seal <sup>TM</sup>	(BMP)

Table 4.5.8-1. (Continued).

Characteristic	DOT 55-gal Drum	6M Shipping Packages (ES-51526)	Criterion Basis
Gross weight	≤ 800 lb/drum	≤ 640 lb/package	(Design)
Dimension	55-gal drum	55/100-gal/package	(Design)
Radiation at surface <sup>b</sup>	> 200 mR/h	> 200 mR/h	(BMP)
	≤ 30 R/h	≤ 30 R/h	(RWMC SAR)
Fissionable material <sup>c</sup>	See Table 4.5.5-2	≤ 380 g/package	(RWMC SAR)
Thermal power <sup>d</sup>	≤ 300 W/drum	≤ 300 W/package	(BMP)
Inner container	NA	DOT 2R container	(Design)
Liner	90-mil rigid poly <sup>h</sup> 30-gal drum	NA	(Design)
TID	Yes	Yes	[49 CFR 173.412(b)]
Lid gasket <sup>e</sup>	Watertight	Watertight	(49 CFR 173.24)

a. This 400-lb limit is a handling limitation capacity at the RWMC.

b. Upper radiation limit based on RWMC free-air transfer safety considerations.

c. Fissionable material limits are based on low-density assumptions. Low-density fissile waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping contaminated with small amounts of fissionable material.

d. The thermal power generated by waste materials in any remote-handled TRU waste package shall not exceed 300 watts. The thermal power shall be recorded in the data package.

e. Watertight sealed metal (26-gauge minimum wall thickness) or polyethylene containers (0.105-in. minimum thickness) enclosed in a twist/tape or fold/tape closed or heat sealed and vented 0.020-in-thick PVC sleeve.

f. Puncture-proof liner (0.100-in. minimum wall, blow molded polyethylene with 0.06-in.-thick minimum, plain disc cover) enclosed in a twist/tape or fold/tape closed or heat sealed and vented, 0.020-in-thick PVC liner. Puncture-proof liner obtainable from Container Corporation of America, Plastics Division, 30-gal CK Tank No. 1829.

g. The lid gasket is coated with Permatex<sup>TM</sup> No. 2 nonhardening adhesive or equivalent applied to the seal areas.

h. A rigid polyethylene liner (procurement specification ES-50357), is used inside the UN 1A2 drum.



#### **4.5.9 Low-Level Waste to Private Sector Treatment, Storage, or Disposal Facilities**

INEEL generators may use private sector TSDFs subcontracted by LMITCO. If these TSDFs are used, WGS will identify facility specific requirements to be met. The completed documentation, including IWTS Material and Waste Characterization Profile for shipments to and from the private sector TSDFs will be reviewed and approved by WGS. Waste disposed of at a private sector TSDF is documented in the IWTS.

#### **4.5.10 Contact-Handled, Low-Level Waste to be Stored at the Radioactive Mixed Waste Staging Facility (RMWSF CPP-1617)**

In addition to meeting all the criteria in Subsection 4.5.1, the following acceptance criteria shall also be met before shipping and receiving at RMWSF.

**NOTE:** *The facility SAR is not written to cover shipments from off-Site facilities.*

1. Fissile materials are packaged
  - a. Only in containers that are greater than 5 gal
  - b. In quantities less than 15 grams per container.
2. Standard DOT or UN1A2-approved containers defined in 49 CFR 173 are used to contain waste.
3. Overpacking of waste containers is allowed in DOT-approved overpacks or salvage containers (49 CFR 173.25)
4. A minimum of 10% ullage is left when filling containers with liquids to allow for expansion (BMP)
5. Heavy items are placed in the bottom of the container (BMP)
6. For nonliquids, the container is filled as full as possible to avoid void space and to ensure proper packing material is used (BMP)
7. Solid and liquid waste is packaged in separate containers (49 CFR 173)
8. No free liquids are packaged, unless they are packaged as such (BMP).
9. Containers on pallets are banded and secured to pallets to prevent shifting during transportation (BMP).
10. Container protection, such as dimensional lumber is used to prevent deformation of the container (BMP).
11. Liquid waste containers
  - a. Are located to prevent entry of rain or foreign material (BMP)
  - b. Are located to prevent freezing (BMP)
  - c. Are not stacked (BMP)

## 4.6 Mixed Low-Level Waste

### 4.6.1 General

The following acceptance criteria shall apply to all mixed low-level waste (MLLW) shipped to WROC for processing at the Waste Experimental Reduction Facility (WERF); shipped to WROC for storage at the Mixed Waste Storage Facility (MWSF), the MWSF Portable Storage Units (PSUs), or the WERF Waste Storage Building (WWSB); shipped to the Radioactive Waste Management Complex (RWMC), the Test Area North (TAN), the Radioactive Mixed Waste Staging Facility (RMWSF), shipped to private sector treatment, storage, or disposal facilities, or shipped to ICPP for processing. These criteria apply in addition to the criteria noted in the appropriate Subsections 4.6.2 through 4.6.12.

**NOTE:** *RCRA statutory and permit requirements preempt any other requirements when there is a potential conflict. Waste acceptance is subject to capacity limitations of receiving facility.*

1. A Notification of Planned Mixed Waste Generation form and an LDR Mixed Waste Generation Evaluation form have been submitted to and approved by the LMITCO Mixed Waste Information System Administrator, MS 2414. (BMP)
2. A waste treatment plan has been submitted to and approved by the LMITCO Mixed Waste Information System Administrator, MS 2414, prior to accepting the waste for storage (BMP).
3. For waste to be received at INEEL facilities only, receiving facility WAP quality assurance requirements are met.
4. The RCRA hazardous waste determination meets the requirements in 40 CFR 262.11
5. A completed IWTS M&WCP for each waste stream has been submitted to and approved by WGS and is current within 12 months of the waste shipment or transfer to the receiving facility (BMP).

**NOTE:** *The submitted IWTS M&WCP is reviewed by Waste Generator Services (WGS) for the initial receiving organization in coordination with other appropriate representatives of facilities that are scheduled to receive the waste for subsequent treatment or disposal, as applicable.*

6. For waste to be shipped to INEEL facilities:
  - a. Pertinent information for instruments, equipment, and procedures used for isotope detection and quantification is included in the Waste Certification Program for WGS concurrence (see Section 2.1.6) (BMP).
  - b. Isotopes originating from INEEL nuclear reactors or similar are reported per Table 4.6.2-2 or approved equivalent process incorporating analytical methods and scaling factors approved through the generators Waste Certification Program. Other sources of radionuclides are handled on a case-by-case basis.

**4.6.1 MLLW General  
(continued)**

7. IWTS Container Profile and Shipment Task Profile (electronic submittal) or Shipment Request and Certification Report (SR&CR) (hardcopy) has been completed for each waste package before shipment.
8. The following documentation accompanies each shipment of waste:
  - a. For RCRA hazardous waste and TSCA regulated waste only, EPA Form 8700-22, Uniform Hazardous Waste Manifest (40 CFR 263). For INEEL on-Site shipments, Block 15 of the manifest is marked "On-Site Use Only" (BMP)
  - b. A bill of lading for other wastes and materials.
  - c. Land disposal restriction notifications and certifications, as applicable (40 CFR 268.7 and 40 CFR 268, Subpart D).
9. The waste does not contain
  - a. Undeclared hazardous waste [40 CFR 262.10(e)].
  - b. Undeclared radioactive materials (BMP).
  - c. Classified material, that has not been altered to remove the classification, except for waste to be stored at WWSB [DOE Order 5820.2A, Chapter III, No. e (5)(e)].

**NOTE:** *Classified material may be stored in WWSB. Concurrence to store must be obtained from the WROC Department Manager prior to acceptance to ensure appropriate security is in place.*

  - d. RCRA hazardous wastes having EPA RCRA hazardous waste numbers not included in the applicable INEEL RCRA Part A Permit Application for INEEL receiving facilities only (INEEL RCRA Part A Permit Application).
10. Total VOC concentration in wastes containing total VOCs greater than 500 ppm by weight, as determined by Method 25D in 40 CFR 60, Appendix A, and 40 CFR 254.1084(a)(5), is reported on the IWTS M&WCP or the form series.
11. Supporting information supplied with the IWTS M&WCP includes, at a minimum, analytical results summaries if analysis has been used to characterize the waste (Interim Status Waste Analysis Plans for the MWSF/MWSF PSUs and the WWSB).
12. Waste is not a
  - a. Department of Transportation (DOT) Class 1 explosive or Class 4 Division 4.1 flammable solid that meets the definition of a wetted explosive under 49 CFR 173.124(a)(1) as identified in 49 CFR 173, Subparts C and D (WERF, RWMC, and MWSF SARs, and BMP for TAN).

**4.6.1 MLLW General  
(continued)**

**NOTE:** *See 49 CFR 173.53 for correspondence of these explosives with explosives formerly identified as Class A, B, and C.*

- b. Pyrophoric material as defined in 49 CFR 173.124(b)(1) or shock-sensitive material as confirmed by WGS (WERF, RWMC, and MWSF SARs) (BMP for TAN).
  - c. Forbidden material, as defined in 49 CFR 173.21, or forbidden explosive, as defined in 49 CFR 173.54 or specified by the facility SAR.
13. Fissile reporting requirements are receiving facility specific. Generators send nuclear accountability documentation, as applicable, to the special nuclear materials accountability program (ID letter). MC and Reporting Procedures for Waste Data, dated August 29, 1983, H. R. Martin, Chief Safeguard and Materials Management Branch.
14. Inner containers that are waste, i.e., not containing waste (lab pack inner containers or aerosol cans) have lids removed or are vented.
15. Wastes within a container including sorbents and dunnage and on the load are compatible with each other or are properly segregated (49 CFR 173.24(e), 177.848, and 40 CFR 264.17, 264.177).

**NOTE:** *Examples of resources that may be used to determine compatibility are the tables in Appendix V of 40 CFR 264 and 265 and 49 CFR 177.848.*

16. Waste complies with 40 CFR 268.3 dilution prohibition.
17. Outer containers are in new or as new condition and are free of bulges, holes, swelling, significant rust, ice, snow, dirt, dents, or similar evidence of degradation or mishandling (49 CFR 173.475).

**NOTE:** *WGS will have the final authority as to what constitutes degradation.*

18. Containers are loaded so that

- a. Heavy items are placed at the bottom of the container (BMP).

**NOTE:** *Floor loading limits and handling equipment capacities may limit the weights of packages that otherwise comply with DOT requirements. Contact WGS to determine such limits.*

- b. Bulky and heavy items are blocked and/or braced inside the waste containers to prevent a shift of the waste that may reduce the effectiveness of the package during transport and handling (BMP, 49 CFR 173.24).
- c. Void space for nonliquid waste is filled with waste to the fullest extent practicable (BMP).
- d. A minimum of 10% void space for liquid waste remains in the container (BMP).

**4.6.1 MLLW General  
(continued)**

19. PCB wastes are packaged in accordance with the applicable Toxic Substances Control Act requirements in 40 CFR 761.5. Use of the PCB packaging exemptions in 40 CFR 761.65 (e)6, for nonliquids or 40 CFR 761.65(c)7] for liquids is formally approved by the WGS.
20. Combination packaging meets the specific requirements in 40 CFR 264.316, 49 CFR 173.12, and 49 CFR 173.24a(a).
21. Packaging, including inner packaging in combination packaging, is properly closed, secure, and leakproof to prevent identifiable release of hazardous or radioactive materials to the environment under storage and transportation conditions of 49 CFR 173.24(f) and 49 CFR 173.24a(a).
22. Packages containing radioactive materials > 2 nCi/g pass the quality control inspection requirements to qualify for shipment (49 CFR 173.475).
23. Labels and markings are
  - a. Per 49 CFR 172 Subparts D and E (172.300 and 172.400)
  - b. Placed so that one full set of labels and markings for each package is visible during shipment (BMP).
  - c. Inclusive of the accumulation start date for RCRA Hazardous Waste (permit)
  - d. Shipper's unique container identification number, which may be
    - (1) A marking in which the first four characters identify the facility, the second two digits identify the current calendar year, and the last four digits are the container number [a new sequence of container numbers (commencing with 0001) is initiated each January 1] i.e., ZYXW-99-0001, or
    - (2) a barcode number issued by WGS

**NOTE:** *Extraneous markings may be painted over in lieu of removal by other means.*

24. Removable surface contamination on each waste package does not exceed 200 dpm/100 cm<sup>2</sup> beta gamma and 20 dpm/100 cm<sup>2</sup> alpha (RCRA Permit and 40 CFR 173.443).

**NOTE:** *Additional radiological requirements may be imposed to meet facility-specific requirements (see the applicable RRWAC section(s) for the intended receiving facility or facilities).*

25. Any specialized rigging required to hoist the shipment
  - a. Accompanies and remains with the shipment (BMP)

**4.6.1 MLLW General  
(continued)**

- b. Meets the requirements of and is inspected in accordance with the DOE *Standard, Hoisting and Rigging*
- c. Has an inspection that has been verified as current by the receiving organization (DOE *Standard, Hoisting and Rigging*).
- d. Any specialized rigging required to hoist the shipment is for a single-point hook connection (BMP).
- e. Waste packages requiring rigging for crane lifts are prerigged and specified on a case-by-case basis (DOE *Standard Hoisting and Rigging*).

**4.6.2 Mixed Low-Level Waste to be Incinerated at the Waste Experimental Reduction Facility**

In addition to meeting all the criteria of Sections 4.6.1, 4.6.5, and 4.6.6, the following acceptance criteria shall also be met for waste to be incinerated at WERF.

**NOTE:** *Waste must be received and accepted at the WWSB, MWSF, or MWSF-PSUs before being transferred to WERF.*

- 1. Waste does not contain
  - a. Alpha-emitting transuranic radionuclides with half-lives greater than 20 years in concentrations  $\geq 0.1$  nCi/g (BMP).
  - b. PCBs  $\geq 5$  ppm (Idaho Air Pollution Act 16.01.01). Waste with a PCB content  $>5$ ppm but  $<50$  ppm can be incinerated at WERF if it is blended with other waste, such that the waste actually fed into the incinerator is  $<5$  ppm.
  - c. Pressurized containers (INEEL RCRA Permit).
  - d. Asbestos (BMP).
  - e. Large metal objects (BMP).

**NOTE:** *Small metal objects such as snaps, buttons, paper clips, staples, and zippers, are acceptable.*

- f. Flammable liquids having a flashpoint below 100°F. (37.8°C.) in larger quantities per container than given in Table 4.6.2-1 (BMP)

4.6.2 MLLW to be Incinerated at the WERF  
(continued)

Table 4.6.2-1. Flammable Liquid Limits per Container.

29 CFR 1910.106 Flammability Class	Definition of Flammability Class	Maximum Quantity per Container (Gallons)
IA	Flashpoint below 73 °F (22.8 °C) and boiling point below 100 °F (37.8 °C)	20
IB	Flashpoint below 73 °F (22.8 °C) and boiling point at or above 100 °F (37.8 °C)	30
IC	Flashpoint at or above 73 °F (22.8 °C) and below 100 °F (37.8 °C)	40

- g. Soils in quantity (BMP).

**NOTE:** *The WERF incinerator is not suited to incineration of large quantities of soils or other nonincinerables. Acceptable quantities will in part depend on the amount of the waste in question and on other types of waste available to be burned.*

- h. Absorbers in quantity that have high ash content such as vermiculite, diatomaceous earth, kitty litter, and FLOR-DRI™ (BMP).

**NOTE:** *Examples of acceptable incinerable absorbents are sawdust, corncob fractions, polypropylene or polyurethane materials, rags, cloth, or paper products. Acceptable quantities of high ash content absorbents will in part depend on the amount of the waste in question and on other types of waste available to be burned.*

- i. Glass and fiberglass in quantity (BMP).

**NOTE:** *If all other conditions are met for the waste stream, HEPA filters, baghouse filters, and other small quantities of glass may be acceptable. Contact WGS information.*

**NOTE:** *40 CFR 268, Appendix XI, lists additional wastes prohibited by 40 CFR 268.3(c).*

2. If any fissionable material is present, WGS is contacted (see RRWAC definition of fissionable material) (WERF-SAR).

4.6.2 MLLW to be Incinerated at the WERF  
(continued)**Table 4.6.2-2. WROC Radionuclide Reporting Requirements (WROC-EDF-392).**

ISOTOPE	ANALYSIS	REPORTING <sup>2</sup>
H-3 (liquid)	H-3 Analysis or at least specifically accounted for on all liquids	Specifically accounted for or All statistically positive results <sup>3</sup>
All gamma emitters	Gamma spectrometric measurements	All statistically positive results <sup>3</sup>
Sr-90	Isotopic Analysis	All statistically positive results <sup>3</sup>
Ba-137m	Calculation/Scaling	0.935 X Cs-137 <sup>4</sup>
Y-90	Calculation/Scaling	1.0 X Sr-90 <sup>4</sup>
C-14	Calculation/Scaling	0.001 X Co-60 <sup>4</sup>
Ni-63	Calculation/Scaling	1.0 X Co-60 <sup>4</sup>
Ni-59	Calculation/Scaling	0.01 X Co-60 <sup>4</sup>
Fe-55	Calculation/Scaling	1.0 X Co-60 <sup>4</sup>
Pm-147	Calculation/Scaling	2.0 X Cs-137 or Sr-90 which ever is $\geq$ <sup>4</sup>
All alpha emitters	Gross Alpha Count	All statistically positive results <sup>3</sup>
Identify alpha emitters > 30pCi/g for incinerable and > 100 pCi/g all other	Spectrometric Alpha <sup>1</sup>	All statistically positive results <sup>3</sup> and their significant progeny if listed in Table 4.6.2-3
Hard-to-detect nuclides listed in Table 4.5.2-4	Determine if any of the hard-to-detect nuclides are present.	Report isotopes present $\geq$ the IC values of Table 4.6.2-4.

1. Spectrometric analysis is not required if alpha activity is < 30 pCi/g for incinerable waste, and  $\leq$  100 pCi/g for all other. It is only necessary to identify enough alpha emitters so that the remaining unidentified isotopes are < 30 pCi/g for incinerable waste and  $\leq$  100 pCi/g for all other waste. Certain alpha emitting parents may be calculated if the concentration of their progeny has been determined by other means such as gamma spectrometric measurements. Example, after three years of decay, Pu-241 would be present at a concentration 193 times the concentration of Am-241, which is easily determined by gamma spectrometric measurement.

2. Concentrations below the limits specified need not be reported unless required by 49 CFR 173.433

3. All radioanalytical results that are statistically positive at the 95% confidence level and above the sample specific minimum detectable activity concentrations.

4. Other scaling factors may be used if an appropriate technical basis is provided.

**Table 4.6.2-3. Alpha Emitting Isotope Significant Progeny.**

Parent Isotope	Significant Progeny Isotope	Reporting
Am-243	Np-239	1.0 X Am-243 Ci. Value
Np-237	Pa-233	1.0 X Np-237 Ci. Value
U-235 (3 progeny)	Th-231	1.0 X U-235 Ci. Value
	Pa-231	0.001 X U-235 Ci. Value
	Ac-227	0.001 X U-235 Ci. Value
U-238 (3 progeny)	Th-234	1.0 X U-238 Ci. Value
	Pa-234	0.0016 X U-238 Ci. Value
	Pa-234m	1.0 X U-238 Ci. Value



4.6.2 MLLW to be Incinerated at the WERF  
(continued)

**Table 4.6.2-4. Hard to Detect Radionuclides and Insignificant Concentrations (IC).**

Isotope	IC <sup>1</sup> Ci/g	Isotope	IC <sup>1</sup> Ci/g	Isotope	IC <sup>1</sup> Ci/g
Ar-39	8.81E-09	Hf-172	4.14E-10	Si-32	2.29E-10
As-73	2.38E-08	Hg-194	5.11E-11	Sm-145	1.59E-08
Au-195	1.41E-08	I-125	1.23E-13	Sn-113	5.73E-09
Be-10	4.58E-10	La-137	2.73E-09	Ta-179	4.14E-08
Ca-41	7.05E-09	Lu-174m	5.73E-09	Tb-157	1.41E-08
Ca-45	4.85E-09	Mn-53	1.32E-07	Tc-97	7.84E-08
Cd-109	7.93E-10	Os-194	3.61E-10	Tc-97m	1.50E-08
Cd-113m	5.11E-11	P-32	2.64E-09	Te-123m	1.76E-09
Cl-36	1.50E-09	Pb-202	2.64E-10	Tl-204	5.29E-09
Dy-159	1.06E-08	Pb-205	1.06E-08	Ti-44	2.73E-10
Fe-60	7.84E-11	Pm-145	8.81E-09	Tm-170	2.29E-09
Gd-148	3.61E-11	Pt-193	1.06E-07	Tm-171	1.41E-08
Gd-152	4.58E-13	Re-187	1.50E-06	V-49	1.94E-07
Ge-68	4.41E-09	S-35	1.72E-08	W-181	5.73E-08

1. Concentrations below the limits of Tables 4.6.2-2, 4.6.2-3, and 4.6.2-4 need not be reported unless required by 49 CFR 173.433

**NOTE:** *This reporting guidance is not to be misconstrued as a definition of nonradioactive or unrestricted release limits.*

3. In addition to the shipping container, all interior waste packagings, such as plastic bags, glass bottles and absorbents, and their composition are identified (WERF WAP).

4.6.2 MLLW to be Incinerated at the WERF  
(continued)**Table 4.6.2-5. WERF-Specific Waste Characterization Information Required on IWTS Material and Waste Characterization Profile for Mixed Low-Level Waste to be Incinerated at the WERF.<sup>a</sup>**

Parameter	Criterion basis	Parameter	Criterion basis
Applicable RCRA treatment standards	40 CFR 268	RCRA Treatability Groups/Subcategories	40 CFR 268)
Quantity of soil, inorganic absorbent, glass, metal, or other bulk inorganic components not RCRA regulated, w%	(BMP)	Total volatile matter content (total approximate content analysis)	WERF WAP)
For RCRA wastewaters only, total suspended particulates, ppm	(BMP)	Ash content, wt%	WERF WAP)
Flash point, °F	(BMP)		
Density or specific gravity	(BMP)	Total arsenic, ppm	WERF WAP)
Fissionable material, nCi/g	(BMP)	Total antimony, ppm	WERF WAP)
Alpha-emitting transuranic nuclides, nCi/g	(BMP)	Total barium, ppm	WERF WAP)
Specific gamma activity, uCi/g	(BMP)	Total beryllium, ppm	WERF WAP)
Estimated heating value, BTU/lb	(40 CFR 265)	Total cadmium, ppm	
Water content, %	(BMP)	Total chromium, ppm	WERF WAP)
Viscosity (liquids only), SSU	(BMP)	Total lead, ppm	WERF WAP)
Total fluorine, ppm	(BMP)	Total mercury, ppm	WERF WAP)
Total chlorine, ppm	(40 CFR 264)	Total nickel, ppm	WERF WAP)
Total halogen, ppm	(40 CFR 265)	Total selenium, ppm	WERF WAP)
Total sulfur, ppm	(40 CFR 265)	Total silver, ppm	WERF WAP)
Whether total VOCs $\geq$ 100 ppm	(40 CFR 265)	Total thallium, ppm	WERF WAP)
a. All ppms are wt/wt basis.			

#### 4.6.3 Mixed Low-Level Waste to be Stabilized at the Waste Experimental Reduction Facility

In addition to meeting all the criteria of Sections 4.6.1, 4.6.4, and 4.6.5, the following acceptance criteria shall also be met before shipping or transferring to WERF any MLLW to be stabilized at the WERF.

1. Prior to WROC receiving waste forms for storage and stabilization, the WROC Stabilization Project Manager
  - a. Reviews and approves the IWTS Material and Waste Characterization data including supplemental information (DOE Order 5820.2A)
  - b. Approves the associated bench scale recipe development (WAP)
  - c. Develops the stabilization plan (BMP)
2. Waste does not contain asbestos (40 CFR 61).
3. Waste is not
  - a. RCRA characteristic for corrosivity (D002) (WERF WAP)
  - b. Incompatible with the selected binding agent or other additives in the stabilization recipe (WERF WAP).
4. PCB content is less than 50 ppm (WERF-SAR, Chapter 4).
5. Liquid waste packaging meets any special requirements determined by WGS be needed to facilitate stabilization of liquid waste. Contact WGS information.

**NOTE:** *Examples of potential special packaging requirements are open head containers, square containers, or designated amounts of waste in each container as determined by the stabilization recipe.*

#### 4.6.4 Mixed Low-Level Waste to be Stored at the Mixed Waste Storage Facility and Mixed Waste Storage Facility Portable Storage Units

In addition to meeting all the criteria of Subsection 4.6.1, the following acceptance criteria shall also be met before shipping MLLW to be stored at either the MWSF or an MWSF PSU.

**NOTE:** *Contact WGS if any fissionable material is present.*

1. Waste does not contain
  - a. Pressurized vessels or containers, including compressed gas cylinders, other than pressurized aerosol cans (MWSF SAR).
  - b. Waste in a gaseous state as opposed to a liquid/vapor state, but vented aerosol cans are allowed (BMP).
2. Wooden boxes
  - a. Are as described on the approved IWTS Shipment and Relocation Profile (S&RP).

4.6.4 MLLW to be stored at the MWSF and MWSF-PSUs  
(continued)

**NOTE:** *The GI is contacted before any waste is packaged in wooden containers to ensure the packages will be acceptable.*

- b. All exterior surfaces are painted with near white, exterior, fire-retardant paint and have a flame spread rating of 25-75, according to American Society for Testing and Materials E-84.6 (BMP). (Uniform Fire Code Section 8003.13)

**NOTE:** *Recommended paints and flame test results for each paint are in Evaluation of Fire-Retardant Paints for Use at the INEEL (WM-FI-22-005) (BMP).*

3. Fissile material

- a. Does not exceed one gram in packages that are less than or equal to 15 L in capacity (MWSF/MWSF-PSUs SAR, Chapter 4).
- b. Is less than fifteen grams in packages that are more than 15 L in capacity, except for packages containing only WERF ash (MWSF/MWSF-PSUs SAR, Chapter 4, WERF SAR, Chapter 4).
- c. Does not exceed two hundred fifty grams in any package containing WERF incinerator ash only (MWSF/MWSF-PSUs SAR, Chapter 4).

**NOTE:** *If U-235 is less than 0.71% of the total uranium content, the uranium is depleted and is not fissile material for the purpose of this criterion (MWSF/MWSF-PSUs SAR, Chapter 4; WERF SAR, Chapter 4).*

- 4. Gasketing, pressure relief, or if necessary, venting requirements and provisions, are as specified in 49 CFR 173.24.
- 5. Radiological dose does not exceed 20 mrem/hour at the package surface unless approved by WGS (BMP).
- 6. A package is placed on a pallet if the package
  - a. Does not have integral skids or other hoisting mean
  - b. Is larger than 5-gal capacity (BMP)
  - c. Contains ignitable, flammable, or reactive wastes (BMP).
- 7. Palletization conforms to the following requirements:
  - a. Pallets are in structurally sound condition, without extensive splits, significant cracks, or crushing (BMP).
  - b. Packages are secured together for palletized loads of more than one package (BMP).
  - c. Packages are secured to the pallet (BMP).

#### 4.6.5 Mixed Low-Level Waste to be Stored at the Waste Experimental Reduction Facility Waste Storage Building

In addition to meeting all the criteria of Subsections 4.6.1 and 4.6.5, the following acceptance criteria shall also be met before shipping MLLW to the WWSB.

1. The waste does not contain PCBs  $\geq 50$  ppm, unless WGS has verified that proper secondary containment is available (BMP).
2. Radiological characteristics are within the limits shown in Table 4.6.6-1.

**Table 4.6.5-1. Mixed Low-Level Waste to be Stored at the WWSB.**

Characteristic	Limits	Criterion basis
Radiation	$\leq 200$ mrem/h at contact	(BMP)
Fissionable material	Contact WGS if any fissionable material is present	(WERF SAR, Chapter 4)
Alpha-emitting, transuranic radionuclides	$\leq 10$ nCi/g	(BMP)

3. Standard containers for MLLW to be stored at the WWSB are any of the following:

**NOTE:** *This item is a storage requirement only. DOT packaging requirements are still met where applicable*

- a. Incinerable box (for LSA only),  $2 \times 2 \times 2$ -ft maximum, in authorized DOT shipping container
- b. DOT 17E or UN 1A1 drum (with bung hole)
- c. DOT 17C or UN 1A2 drum
- d. DOT 7A Type A, 71-gal Square Drum
- e. DOT 17H or UN 1A2 drum
- f. DOT 6C or UN 1A2 drum
- g. DOT 7A Type A D&D Bin
- h. DOT 7A Type A B-25 Bin
- i. UN 1H1 plastic drum
- j. UN 1H2 plastic drum.

#### **4.6.6 Mixed Low-Level Waste to be Stored at the Radioactive Waste Management Complex**

Authorization to place newly generated MLLW into storage at the RWMC may be received after meeting all of the applicable criteria of Subsections 4.6.1, 4.6.4, and 4.6.5, except for specific packaging, characterization, and administrative criteria within this subsection. The following specific criteria supersede similar criteria of Subsections 4.6.1, 4.6.4, and 4.6.5.

1. Approval to store MLLW at the RWMC is obtained from the RWMC facility manager (BMP).
2. Waste does not contain
  - a. Free liquids (DOE Order 5820.2A)
  - b. PCBs INEEL RCRA (Permit)
  - c. Materials capable of generating toxic gases, vapors, or fumes (BMP)
  - d. Chelating agents, except as residue (INEEL RCRA permit)
  - e. Active etiological agents (INEEL RCRA permit).
3. Waste is not
  - a. RCRA characteristic ignitable waste (D001) (40 CFR 261.21)
  - b. RCRA characteristic corrosive waste (D002) (40 CFR 261.22)
  - c. RCRA characteristic reactive waste (D003) (40 CFR 261.23)
  - d. From a foreign source (INEEL RCRA Permit).
4. Absorbents or stabilizers used to eliminate free liquids, per DOE Order 5820.2A, have undergone the generator's bench-scale testing that demonstrates
  - a. Performance is, as specified by the vendor, or an improved specific use methodology has been developed.
  - b. Liquids do not separate from the absorbents or stabilizing agents due to ambient temperature cycles ranging from -50 °F to 110 °F.
5. Dry-loaded waste packages, such as drums, boxes, or inserts with a potential for free liquid have
  - a. An optimum absorbent or stabilizing agent, as determined in Item 4 above, used to ensure immobilization of free liquid.
  - b. Absorbents or stabilizing agents placed inside the innermost waste bag or container where the free liquid is suspect.

**4.6.6 MLLW to be stored at the RWMC  
(continued)**

- c. Absorbents and stabilizing agents placed as close as practical to inaccessible liquid (BMP).
6. Each container is vented with a Nucfil™ venting device (one vent per drum and two vents per standard waste box) to allow passage of hydrogen gas (INEEL RCRA Permit).
7. Fissile material concentration in of the waste does not exceed the limits listed in Table 4.6.7-1 (RWMC SAR).
8. Packages with surface radiation levels  $\leq 200$  mR/h meet the requirements of Table 4.6.7-2.

**Table 4.6.6-1. Fissile Material Concentration Limits (RWMC SAR).**

Waste Matrix Group	Polyethylene	Cellulose	Metal(Al) <sup>a</sup>	Concrete	Brick	Glass/Slag	Graphite	Salt
TVC <sup>b,c,d</sup> g/lb	3.10	1.30	0.82	0.38	0.23	0.09	0.02	5.53
g/kg	6.82	2.86	1.8	0.84	0.51	0.20	0.04	12.17
TVC <sup>d</sup> U-233 g/lb	4.98	2.16	0.38	0.62	0.34	0.15	0.03	4.27
g/kg	11.0	4.75	0.84	1.36	0.75	0.33	0.07	9.39
<p>a. To be conservative the threshold value for metal is calculated on aluminum.</p> <p>b. Threshold value concentration (TVC).</p> <p>c. For all fissile radioisotopes except U-233.</p> <p>d. Fissile limit for each waste package is 380 grams.</p>								

4.6.6 MLLW to be stored at the RWMC  
(continued)**Table 4.6.6-2.** Contact-Handled, Mixed Low-Level Waste to be Stored at the RWMC.

Characteristic	DOT 17C Drum	DOT 7A Type A Waste Box	Criterion Basis
Gross weight	≤ 800 lb/drum	≤ 4,000 lb/box	(Design)
Dimension	55-gal	55 × 71 × 37 in. high	(Design)
Fissionable material <sup>a</sup>	See Table 4.6.7-1	See Table 4.6.7-1	(RWMC SAR)
TRU content	≤ 100 nCi/g	≤ 100 nCi/g	(DOE 5820.2A)
Thermal power <sup>b</sup>	≤ 0.1 W/ft <sup>3</sup> (3.5 w/m <sup>3</sup> )	≤ 0.1 W/ft <sup>3</sup> (3.5 W/m <sup>3</sup> )	(BMP)
Liner	90-mil rigid polyethylene <sup>c</sup>	NA	(RWMC)
Tamper indicating device (TID)	Yes <sup>d</sup>	Yes <sup>d</sup>	(BMP)
Lid gasket	Watertight <sup>e</sup>	Watertight <sup>f</sup>	(49 CFR 173.24)

a. Fissionable material limits are based on low-density and volumetric-average assumptions. Low-density fissile waste consists of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping contaminated with small amounts of fissionable material. Volumetric average is defined as concentration obtained by dividing the total fissionable material content of a container by its volume.

b. Individual waste packages in which the average thermal power density exceeds 0.1 w/ft<sup>3</sup> (3.5 w/m<sup>3</sup>) has the thermal power recorded in the data package.

c. A rigid polyethylene liner per procurement specification ES-50357 is used inside each DOT 17C or UN 1A2 drum.

d. Each container has a TID installed by the waste generator in such a manner as to preclude removal of the lid without destroying the TID.

e. The lid gasket is coated with Permatex<sup>TM</sup> No. 2 nonhardening adhesive or equivalent and applied to the seal areas.

f. Neoprene gasket (1-1/2-in. wide × 1/2-in. thick) bonded to the body.

9. Radiation levels of waste packages are verified by the RWMC receiving organization to agree with those reported by the waste generator at the time of shipment to within the following amounts (BMP):
  - a. ± 100% for reported levels ≤ 10 mR/h
  - b. ± 20% for reported levels > 10 mR/h.
10. Layers of plastic and gas generation are limited to prevent the accumulation of flammable mixtures and pressure buildup in the transport device (TRAMPAC).



**4.6.6 MLLW to be stored at the RWMC  
(continued)**

11. Waste packages are provided with lifting devices or permanently attached handling features *(DOE Standard Hoisting and Rigging)*.
12. Lifting rings and other auxiliary lifting devices on the package are recessed, offset, or hinged in a manner that does not inhibit stacking *(DOE Standard Hoisting and Rigging)*.
13. Special hoisting and rigging requirements provided by the waste receiving facility are met (BMP).
14. Internal waste container loading is maximized, (INEEL RCRA Permit).

**NOTE:** *The actual density of the waste material is considered when determining void volume. Reduction of void volumes resulting from container design are the responsibility of the container design owner and will be assessed for improved design.*

15. The layers of plastic containment are known and minimized (TRAMPAC).
16. A nonstandard package of an approved waste stream is a new waste stream (INEEL RCRA Permit).
17. Standard containers for MLLW are any of the following:
  - a. DOT 17C 55-gal Drum
  - b. DOT 17H 30-gal Drum
  - c. 6M Shipping Packages (ES-51526)
  - d. DOT 7A Type A, TRUPACT II Standard Waste Box
  - e. Hot Fuel Examination Facility (HFEF)-5 Waste Canister, DOE-ID approved.
18. Packages with surface radiation levels > 200 mR/h meet the requirements of Table 4.6.7-3.

**Table 4.6.6-3. Remote-Handled, Mixed Low-Level Waste to be Stored at the RWMC.**

Characteristic	DOT 17H	HFEF-5 Waste Can	Criterion Basis
Gross weight	≤ 400 lb/drum <sup>a</sup>	≤ 1,000 lb/can	(Design)
Dimension	30-gal drum	12.375 in. dia. × 74.5 in.	(Design)
Radiation at surface	≤ 30 R/h	< 1,000 R/h <sup>b,c</sup>	(RWMC SAR)
TRU content	≤ 100 nCi/g	≤ 100 nCi/g	(DOE O 435.1)
Fissionable material <sup>d</sup>	See Table 4.6.7-1	See Table 4.6.7-1	(RWMC SAR)
Thermal power <sup>e</sup>	≤ 300 W/drum	≤ 300 W/can	(BMP)

**Table 4.6.6-3. (Continued).**

Inner container	Sealed metal or poly containers <sup>f</sup>	14-gauge stainless steel	(Design)
Liner	Poly blow molded <sup>g</sup>	NA	(BMP)
TID	Yes <sup>h</sup>	Seal welded or eutectic metal poured over head clamp	(Design)
Characteristic	DOT 17C	6M Shipping Packages (ES-51526)	Criterion Basis
Gross weight	≤ 800 lb/drum	≤ 640 lb/package	(Design)
Dimension	55-gal drum	55- or 100-gal package	(Design)
Radiation at surface	≤ 30 R/h	≤ 30 R/h	(BMP)
Fissionable material <sup>d</sup>	See Table 4.6.7-1	≤ 380 g/package	(RWMC SAR)
TRU content	≤ 100 nCi/g	≤ 100 nCi/g	(DQE O 435.1)
Thermal power <sup>e</sup>	≤ 300 W/drum	≤ 300 W/package	(BMP)
Inner container	NA	DOT 2R container	(49 CFR)
Liner	90-mil rigid poly, <sup>i</sup> or DOT 17H or UN 1A2 drum	NA	(RWMC)
TID	Yes <sup>h</sup>	Yes <sup>h</sup>	(RWMC)

a. This 400-lb limit is a handling limitation capacity at the RWMC.

b. Bottom discharge cask-waste activity is subject to shielding calculations ensuring gamma radiation fields of less than 1 mrem/h at 3 ft above the storage vault. Calculations are the responsibility of the waste generator and are subject to the RWMC approvals.

c. Waste packages do not have a surface dose rate at any point greater than 4,500 R/h. Neutron contributions are limited to 270 mR/h. Neutron contribution of greater than 20 mR/h to the total package dose rate is reported in the data package. Approval is required before remote-handled TRU waste canisters with a dose rate in excess of 100 R/h, but less than 1,000 R/h may be shipped.

d. Fissionable material limits are based on assumed low-density waste contaminated with small amounts of volumetric averaged fissionable material. Low-density waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, piping. Volumetric average is defined as concentration obtained by dividing the total fissionable material content of a container by its volume.

e. The thermal power generated by waste materials in any waste package does not exceed 300 watts. The thermal power is recorded in the data package.

f. Watertight sealed metal (26-gauge minimum wall thickness) or polyethylene containers (0.105-in. minimum thickness) enclosed in a twist/tape or fold/tape closed, or heat sealed and vented 0.020-in.-thick PVC sleeve.

g. Puncture-proof liner (0.100-in. minimum wall, blow molded polyethylene with 0.06-in.-thick minimum, plain discolor) enclosed in a twist/tape or fold/tape closed, or heat sealed and vented, 0.020-in.-thick PVC liner. Puncture-proof liner obtainable from Container Corporation of America, Plastics Division, 30-gal CK Tank No. 1829.

h. Each container has a TID installed by the shipper so as to preclude removal of the head without destroying the TID.

i. A rigid polyethylene liner is used inside the DOT 17C or UN 1A2 drum (procurement specification ES-50357).

#### **4.6.7 Mixed Low-Level Waste to be Stored at Test Area North**

In addition to meeting all the criteria of Subsections 4.6.1, 4.6.4, and 4.6.6, the following acceptance criteria shall also be met before shipping MLLW to Test Area North (TAN)-647.

1. Direct radiation from any package does not exceed 7.5 mrad/hour at 3.3 feet (1 meter) from any package surface (TAN-647 SAR).
2. The presence of fissionable material has been made known to WGS.

**NOTE:** *The storage of known fissionable material at TAN 647 is limited to a total of 15 grams.*

#### **4.6.8 Mixed Low-Level Waste to Private Sector Treatment, Storage, or Disposal Facilities**

INEEL Generators must obtain the assistance of WGS ensure acceptance criteria are met in order to ship waste to such facilities. Acceptance criteria, specific to such facilities that are under contract for the INEEL, will be issued at a later date.

#### **4.6.9 Mixed Low-Level Waste to be Stored at Radioactive Mixed Waste Staging Facility (RMWSF CPP-1617)**

In addition to meeting all the criteria in Subsection 4.6.1, the following acceptance criteria shall also be met before shipping and receiving at RMWSF/HCRWSF.

**NOTE:** *The facility SAR is not written to cover shipments from off-Site facilities.*

1. Wooden boxes
  - a. Are described on IWTS Shipment and Relocation Profile (S&RP) as approved in a given shipment and waste stream by WGS BMP).
  - b. All exterior surfaces are painted with near white, exterior, fire-retardant paint and have a flame spread rating of 25-75 (ASTM E-84.6, BMP). (Uniform Fire Code Section 8003.13)
2. Fissile materials are packaged
  - a. Only in containers that are greater than 5 gal (BMP)
  - b. In quantities less than 15 grams per container (BMP).
3. Standard DOT-approved containers defined in 49 CFR 173 are used to contain waste.
4. Waste packages must meet the following requirements:
  - a. Solid and liquid wastes are packaged in separate containers (49 CFR 173).
  - b. No free liquids are packaged, unless packaged as such (BMP).

**4.6.9 MLLW to be stored at the RMWSF CPP-1617  
(continued)**

5. Liquid waste containers meet the following requirements:
  - a. Located to prevent entry of rainfall or foreign material
  - b. Waste is located to prevent freezing (BMP).
6. Approximately 5% mixed waste received from off-Site ICPP will undergo waste verification. This is based on the generator's annual waste recertification and evaluate approximate percent total number of containers received (BMP).

**4.6.10 Remote-Handled MLLW to be Stored and Treated at Liquid Effluent Treatment and Disposal and Nitric Acid Recycle Tank (LET&D CPP-1618)**

The LET&D Facility at ICPP provides partial treatment of PEW overheads by concentrating liquid and by removing the water from the solution by vaporization. Evaporation is an interim partial treatment and eventually will be treated by WIF. Inclusions of WAC into this document is planned for a later date.

**4.6.11 Contact- and Remote-Handled MLLW to be Stored and Treated at NWCF Debris Treatment and Containment Storage Building (CPP-659)**

The debris treatment is available only for specific <90 day treatment basis. The facility is currently awaiting approval for modifications for the "containment building" to have interim status. Inclusion of WAC into this document is planned for a later date.

## **4.7 Fluid with Radioactive/Hazardous Contamination**

### **4.7.1 General**

Organic and aqueous fluids may be treatable at the Idaho Chemical Processing Plant (ICPP). Section 4.7.2 gives the waste acceptance criteria for the PWTU. Criteria for the ICPP processes are to be issued at a later date.

### **4.7.2 Fluid Radioactive/Hazardous Waste to be Treated at ICPP Process Equipment Waste Evaporator (PEWE CPP-604) and Stored at ICPP WG/WH Cells Storage and Treatment Tanks (WG/WH CPP-601)**

Capability exists at the Idaho Chemical Processing Plant (ICPP) to process liquid radioactive wastes and chemicals, provided the fluids meet specified criteria.

**NOTE:** *The PEWE is a process that reduces the volume of mixed or radioactive liquid by evaporation. The PEWE will accept waste for treatment directly from INEEL and non-INEEL generators and storage facilities and must comply with the PEWE acceptance criteria document (PEW CRM).*

Generators who will generate liquid radioactive/hazardous waste or who are generating or storing liquid radioactive/hazardous waste, will request Waste Generator Services (WGS) to determine if those liquids qualify for treatment at the INTEC Process Equipment Waste Evaporator (PEWE). The generating facility WGS Representative contacts the INTEC WGS Facility Representative to initiate the determination process. Completed characterization documentation, including IWTS Material and Waste Characterization Profiles will be assessed against the PEWE acceptance criteria to make the acceptability determination. Results of the determination process will be documented. Acceptance criteria, specific to the PEWE are maintained by the operating organization.

## 4.8 Transuranic Waste

### 4.8.1 General

The following acceptance criteria shall apply to all transuranic waste to be stored at the Radioactive Waste Management Complex (RWMC). In addition to the criteria noted in Subsections 4.8.2 and 4.8.3, the following acceptance criteria shall apply to all transuranic waste to be stored at the Radioactive Waste Management Complex (RWMC).

**NOTE:** *Due to the detail of the WIPP WAC final requirements and the restrictive criteria of TRUPACT-II transportation requirements, the TRU Waste GI is contacted at 6-0902 or 6-2954 before TRU waste is generated or packaged.*

1. Off-Site non-INEEL generators are required to be authorized by the Department of Energy Idaho Operations Office (DOE-ID) before sending TRU waste for storage at the RWMC.
2. Waste Forecast is current per 2.1.7.
3. A completed IWTS Material and Waste Characterization Profile (M&WCP) for each waste stream has been approved by the receiving organization (INEEL RCRA Permit).
4. Transuranic waste data has been completed electronically for each waste package before shipment [Best Management Practice (BMP)].
5. Nuclear accountability documentation, as applicable, is sent to the special nuclear materials accountability program (BMP, ID letter, MC and A Reporting Procedures for Waste Data, dated August 29, 1983, H. R. Martin, Chief Safeguard and Materials Management Branch).

**NOTE:** *Nuclear accountability documents do not accompany waste shipments.*

6. The following documentation accompanies each shipment:
  - a. A Waste Isolation Pilot Plant Waste Acceptance Criteria (WIPP WAC) Certification Statement for each package of WIPP certified waste (WIPP WAC).
  - b. Approved IWTS Container Profile and Shipment Task Profile (electronic submittal) or Shipment Request and Certification Report (hardcopy) (BMP).
  - c. Properly completed shipping papers
  - d. An approved WIPP Waste Stream Profile.
7. TRU Waste does not contain
  - a. Pressurized containers that are not vented, drained, crushed, or otherwise reconfigured to allow verification via real-time radiography (WIPP WAC, INEEL RCRA Permit).
  - b. Radioactive materials in a gaseous state or in a host medium that will permit such gas to be liberated by the RWMC ambient temperature cycles ranging from -50°F to 110°F (WIPP WAC).
  - c. Classified waste materials (BMP, INEEL RCRA Permit).

**4.8.1 TRU Waste General  
(continued)**

- d. Free liquid (WIPP WAC).
  - e. RCRA regulated waste (40 CFR 261).
  - f. PCBs (INEEL RCRA Permit).
  - g. Materials capable of generating toxic quantities of gases, vapors, or fumes (WIPP WAC, INEEL RCRA Permit).
  - h. Sealed containers (WIPP WAC).
  - i. Any inner containers of waste with volumes greater than 4 liters, unless a relief valve has been blocked open on such inner containers, or they have been visibly punctured [TRUPACT-II authorized methods for payload control (TRAMPAC)].
  - j. Compressed gas containers (WIPP WAC).
  - k. Chelating and complexing agents, except residue material (BMP, INEEL RCRA Permit).
  - l. Radioactive pyrophorics  $\geq 1\%$  of the waste weight (WIPP WAC).
8. Absorbents and stabilizing agents used to eliminate free liquids have undergone the generator's bench-scale testing that demonstrates
- a. That performance is as specified by the vendor, or that an improved specific use methodology has been developed (BMP).
  - b. Liquids do not separate from the absorbents or stabilizing agents due to ambient temperature cycles ranging from -50°F to 110°F (BMP).
9. Dry-loaded waste packages such as drums, boxes, or inserts with a potential for free liquid have
- a. An absorbent or stabilizing agent that is used to ensure immobilization of free liquid as determined in Item 8 above (BMP).
  - b. Absorbent and stabilizing agents placed inside the innermost waste bag or container where the free liquid is suspect (BMP).
  - c. Absorbent and stabilizing agents placed as close as practical to inaccessible liquid (BMP).
10. TRU Waste is not
- a. Pyrophoric, as defined in 49 CFR 173.124(b)(1), Department of Transportation (DOT) Class 1 (formerly Class A, B, or C) explosive, or unstabilized shock-sensitive reactive as determined by the receiving organization generator interface (WIPP WAC, INEEL RCRA Permit)

**4.8.1 TRU Waste General  
(continued)**

- b. Readily capable of detonation, of explosive decomposition, or of reaction at normal pressures and temperatures, or of explosive reaction on contact with water (WIPP WAC, INEEL RCRA Permit)
  - c. Spent nuclear fuel or high-level waste (WIPP WAC, INEEL RCRA Permit).
11. Removable surface contamination on each waste package does not exceed 200 dpm/100 cm<sup>2</sup> beta gamma and 20 dpm/100 cm<sup>2</sup> alpha (RCRA Permit and 40 CFR 173.443)
  12. Bulky and heavy items are blocked and/or braced inside the waste containers to prevent a shift of the waste that may reduce the effectiveness of the package during transport and handling [49 CFR 173.24(b)(2)] (WIPP WAC, INEEL RCRA Permit).
  13. Neutron contributions > 20 mrem/hr are separately documented (WIPP WAC).
  14. Waste packages are chemically and structurally stable and closed with no leakage (49 CFR 173.24, 173.412, 173.425, 173.475; WIPP WAC, INEEL RCRA Permit).
  15. The total concentration of potentially flammable volatile organic compounds is ≤ 500 ppm in the headspace of a payload container (TRAMPAC, WIPP WAC).
  16. Radiation levels defined in these criteria are verified by the generator with calibrated radiation survey instruments (BMP, WIPP WAC, INEEL RCRA Permit).
  17. Radiation levels of waste packages are verified by the RWMC receiving organization to agree with those reported by the waste generator at the time of shipment to within the following amounts (BMP, WIPP WAC, INEEL RCRA Permit):
    - a. ± 100% for reported levels ≤ 10 mR/h
    - b. ± 20% for reported levels > 10 mR/h.)

**Table 4.8.1-1. TRU Waste Fissile Material Concentration Limits (RWMC SAR).**

Waste Matrix Group		Polyethylene	Cellulose	Metal(Al) <sup>a</sup>	Concrete	Brick	Glass/Slag	Graphite	Salt
TVC <sup>b,c</sup>	g/lb	3.10	1.30	0.82	0.38	0.23	0.09	0.02	5.53
	g/kg	6.82	2.86	1.8	0.84	0.51	0.20	0.04	12.17
TVC U-233	g/lb	4.98	2.16	0.38	0.62	0.34	0.15	0.03	4.27
	g/kg	11.0	4.75	0.84	1.36	0.75	0.33	0.07	9.39
<p>a. To be conservative the threshold value for metal is calculated on aluminum.</p> <p>b. Threshold value concentration (TVC).</p> <p>c. For all fissile radioisotopes except U-233.</p>									



**4.8.1 TRU Waste General  
(continued)**

18. Each container is vented (one vent per drum and two vents per standard waste box) to allow release of hydrogen gas (TRU Waste GI is contacted for assistance) (WIPP WAC, INEEL RCRA Permit):
  - a. The container vent is an approved, carbon composite filter (NucFil™ or equivalent).
  - b. The container vent installation date is recorded and used to determine the aspiration period required before shipment.
  - c. Container liner has a  $\geq 0.3$ -in. vent hole or is filtered.
19. PU-239 equivalent activity of following individual waste packages is (WIPP WAC, INEEL RCRA Permit).
  - a. 55-gallon drums, 80 curies equivalent
  - b. Standard Waste Box, 130 curies equivalent
  - c. Standard Waste Box as overpack,  $\leq 1800$  curies equivalent
  - d. Solidified/vitrified waste,  $\leq 1800$  curies equivalent.
20. Packages must pass 49 CFR 173.412 design requirements and 173.475 control requirements (BMP, WIPP WAC, INEEL RCRA Permit).
21. Gas generation is limited to prevent the accumulation of flammable mixtures and pressure buildup in the transport device (TRAMPAC, WIPP WAC, INEEL RCRA Permit).
22. The layers of plastic containment are known and minimized (TRAMPAC, WIPP WAC, INEEL RCRA Permit).
23. Bags are closed using the twist/tape, fold/tape or filtered method (WIPP WAC, INEEL RCRA Permit).
24. Total decay heat plus error are calculated and recorded in the data package for each container (WIPP WAC, INEEL RCRA Permit).
25. Internal waste container void volume, excluding the annulus between any overpack and the original container, should not exceed 15% (INEEL RCRA Permit).
26. Waste packages do not leak contents (49 CFR 173.24, 173.412, and 173.475; INEEL RCRA Permit).
27. Isotopes are detected and quantified, based on the WIPP WAC and WIPP QAPP, with respect to analysis methods and system limitations.

**NOTE:** *This reporting guidance is not to be misconstrued as a definition of nonradioactive or unrestricted release limits.*

28. Tritium waste has been prepared for storage to avoid exceeding an equivalent package release rate of 40 Ci/m<sup>3</sup>/y (BMP, INEEL RCRA Permit).

**4.8.1 TRU Waste General  
(continued)**

29. Wastes within a container are compatible with each other and with the packaging materials; this compatibility is documented [TRUPAC; 49 CFR 173.24(e), 177.848; 40 CFR 264.17; INEEL RCRA Permit].
30. Exterior surfaces of waste packages are free of ice, snow, and dirt (BMP, INEEL RCRA Permit).
31. A nonstandard package from an existing waste stream is a new waste stream (BMP, INEEL RCRA Permit).

**4.8.2 Contact-Handled, Transuranic Waste to be Stored at the Radioactive Waste Management Complex**

In addition to meeting all the criteria of Subsection 4.8.1, the following acceptance criteria shall also be met before shipping contact-handled, TRU waste to the RWMC for storage.

1. Contact-handled, TRU waste, generated by non-INEEL generators in volumes greater than 25 m<sup>3</sup> per year, is certified by the generator to meet the WIPP waste acceptance criteria, including TRAMPAC (DOE-HQ Program Guidance to DOE-ID, 1987).
2. Contact-handled TRU waste generated by INEEL generators is certified to Section 4.8 of the INEEL RRWAC and is certifiable to the WIPP WAC (DOE 5820.2A, Chapter II, 2.a ).
3. The waste is packaged in one of the following standard containers: (WIPP WAC)
  - a. DOT Type A 55-gal Drum
  - b. 6M Shipping Packages (ES-51526)
  - c. DOT 7A Type A, TRUPACT II Standard Waste Box.
  - d. TRUPACT II 10 drum overpack (see WIPP WAC).
4. Markings for contact-handled TRU waste packages include
  - a. Markings that are legibly printed, stenciled, or neatly hand-lettered (49 CFR 172, Subpart D)
  - b. Removal of any extraneous markings such as freehand spray paint markings or graffiti of any kind (BMP)
  - c. Proper DOT markings in accordance with 49 CFR 172, Subpart D and labels in accordance with 49 CFR 172, Subpart E
  - d. Gross weight of the waste package [49 CFR 172.301(d)]
  - e. Shipper's complete name and address [49 CFR 172.301(d)]
  - f. Shippers unique container identification number, which may be
    - (1) A marking in which the first four characters identify the facility, the second two digits identify the current calendar year, and the last four digits are the

#### 4.8.2 Contact-Handled, TRU Waste to be Stored at the RWMC (continued)

container number [a new sequence of container numbers (commencing with 0001) is initiated each January 1] i.e., ZYXW-99-0001, or

- (2) A barcode number issued by the WGS.
- g. Maximum radiation level at contact and at 1 m in air (49 CFR 172.403)
- h. One full set of labels and markings placed on the top and on the appropriate side(s) of each container so that one full set of labels and information for each container shall always be visible (BMP).
- 5. Waste is not RCRA regulated (BMP).
- 6. Waste packages comply with the requirements of Table 4.8.2-1.

**Table 4.8.2-1. Contact-Handled, Transuranic Waste to be Stored at the RWMC.**

Characteristic	DOT 7A Type A 55 gal-Drum	TRUPACT II Standard Waste Box	Criterion Basis
Gross weight	≤ 1,000 lb/drum	≤ 4,000 lb/box	(Design)
Dimension	55 gal	55 × 71 × 37 in. high	(Design)
Surface radiation	≤ 200 mR/h	≤ 200 mR/h	(DOE 5820.2A)
Fissionable material <sup>a</sup>	≤ Table 4.8.1-1 limits, and ≤ 200 g/drum	≤ Table 4.8.1-1 limits, and ≤ 5g/ft <sup>3</sup> , ≤ 325 g/box	(RWMC SAR) (TRAMPAC)
TRU content	> 100 nCi/g	> 100 nCi/g	(DOE 5820.2A)
Thermal power <sup>b</sup>	≤ 0.1 W/ft <sup>3</sup> (3.5 W/m <sup>3</sup> )	≤ 0.1 W/ft <sup>3</sup> (3.5 W/m <sup>3</sup> )	(TRAMPAC)
Liner	90-mil rigid polyethylene <sup>c</sup>	NA	(BMP)
Container bags	minimize	Minimize	(TRAMPAC)
Tamper indicating device (TID) <sup>d</sup>	Yes	Yes	(INEEL RCRA Permit)
Lid gasket watertight	No leakage <sup>e</sup>	No leakage <sup>f</sup>	(49 CFR 173.24)

a. Fissionable material limits are based on assumed low-density waste contaminated with small amounts of volumetric averaged fissionable material. Low-density waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping. Volumetric average is defined as concentration of fissionable material obtained by dividing the total fissionable material content of a container by its volume. The fissionable material limit is the limit listed in the table minus twice the absolute value of the error for the measuring equipment used.

b. Individual, contact-handled, TRU waste packages in which the average thermal power density exceeds 0.1 W/ft<sup>3</sup> (3.5 W/m<sup>3</sup>), shall have the thermal power recorded in the data package.

c. A rigid polyethylene liner, as defined by procurement specification ES-50357, is used inside each UN 1A2 drum.

d. A TID is installed on each container by the waste generator.

e. The lid gasket shall be coated with Permatex<sup>TM</sup> No. 2 nonhardening adhesive or equivalent.

f. The Neoprene gasket is 1-1/2-in.-wide × 1/2-in.-thick.

**4.8.3 Remote-Handled, Transuranic Waste to be Stored at the Radioactive Waste Management Complex**

In addition to meeting all of the criteria of Subsection 4.8.2, except for the surface radiation reading limit, the following acceptance criteria shall also be met before shipping remote-handled, TRU waste to the RWMC for storage.

1. Remote-handled waste, without exception, is certified to the WIPP waste acceptance criteria to the TRAMPAC, and to the criteria in this subsection [DOE-ID Memorandum, May 19, 1987.]
2. Only certified RH TRU waste is accepted at the TRU Storage Facility (DOE-ID Memorandum, May 19, 1987).
3. Waste is packaged in any of the following standard containers: (WIPP WAC)
  - a. DOT 7A Type A 55-gal Drum
  - b. DOT 30-gal Drum
  - c. 6M Shipping Packages (ES-51526)
  - d. Hot Fuel Examination Facility (HFEF)-5 Waste Canister (DOE-ID approved).
4. The container identification number on a remote-handled waste container
  - a. Permanently affixed to the container top
  - b. Is visible and legible through remote, visible verification equipment
  - c. Is directly traceable to waste package content documentation (INEEL RCRA Permit).
5. Waste packages comply with the requirements of Table 4.8.3-1.

**Table 4.8.3-1. Remote-Handled, Transuranic Waste to be Stored at the RWMC.<sup>a</sup>**

Characteristic	(DOT) 7A Type A Drum	HFEF-5 Waste Canister	Criterion Basis
Gross weight	$\leq 400$ lb/drum <sup>b</sup>	$\leq 1,000$ lb/canister	(Design)
Dimension	30-gal drum	12.375 in. dia $\times$ 74.5 in. high	(Design)
Radiation at surface	$> 200$ mR/h $\leq 30$ R/h <sup>c</sup>	$> 200$ mR/h $\leq 1,000$ R/h <sup>d</sup>	(DOE 5820.2A)
TRU content	$> 100$ nCi/g and $\leq 23$ Ci/liter	$> 100$ nCi/g and $\leq 23$ Ci/liter	(RWMC SAR)
Fissionable material <sup>e</sup>	$\leq$ Table 4.8.1-1 limits and $\leq 100$ g/drum	$\leq$ Table 4.8.1-1 limits and $\leq 200$ g/can	(RWMC SAR and DOE 5820.2A)
Thermal power <sup>f</sup>	$\leq 300$ W/drum	$\leq 300$ W/canister	(INEEL RCRA Permit)
Inner container	Sealed metal or poly containers <sup>g</sup>	14-gauge stainless steel	(WIPP WAC)

Table 4.8.3-1. (Continued).

Liner	Poly blow molded <sup>h</sup>	NA	(Design)
TID	Yes <sup>i</sup>	Seal welded or eutectic metal poured over head clamp	(INEEL RCRA Permit)
Characteristic	(DOT) Drum	6M Shipping Packages (ES-51526)	Criterion Basis
Gross weight	≤ 800 lb/drum	≤ 640 lb/package	(Design)
Dimension	55-gal/drum	55/100-gal/package	(Design)
Radiation at surface	> 200 mR/h ≤ 30 R/h <sup>b</sup>	> 200 mR/h ≤ 30 R/h <sup>c</sup>	(DOE 5820.2A)
Fissionable material <sup>e</sup>	≤ Table 4.8.1-1 limits and ≤ 200 g/drum	≤ Table 4.8.1-1 limits and ≤ 200 g/package	(WIPP WAC)
TRU content <sup>b</sup>	> 100 nCi/g and ≤ 23 Ci/liter	> 100 nCi/g and ≤ 23 Ci/liter	(DOE 5820.2A)
Thermal power <sup>f</sup>	≤ 300 W/drum	≤ 300 W/package	(WIPP WAC)
Inner container	NA	DOT 2R container	(DOT)
Liner	90-mil rigid poly <sup>j</sup> , UN 1A2 drum	NA	(Design)
TID	Yes <sup>i</sup>	Yes <sup>i</sup>	(INEEL RCRA Permit)

a. Remote-handled, TRU waste is WIPP-certified, and containers are vented before shipment is authorized.

b. This 400-lb limit is a handling limitation capacity at the RWMC.

c. Upper radiation limit based on INEEL free-air transfer safety considerations.

d. Bottom discharge cask waste activity is subject to shielding calculations ensuring gamma radiation fields of less than 1 mR/h at 3 ft above the storage vault. Calculations are the responsibility of the waste generator and are subject to the RWMC approvals. Remote-handled, TRU waste packages have a surface dose rate at any point no greater than 1,000 R/h. Neutron contributions are limited to 270 mR/h. Neutron contribution of greater than 20 mR/h to the total package dose rate shall be reported in the data package. Approval is required before shipping remote-handled, TRU waste canisters with a dose rate in excess of 100 R/h, but less than 1,000 R/h.

e. Fissionable material limits are based on assumed low-density waste contaminated with small amounts of volumetric averaged fissionable material. Low-density waste is waste consisting of materials such as paper, polyethylene wrap, tape, glass, rags, blotting paper, scrap metal, and piping. Volumetric average is defined as concentrations obtained by dividing the total fissionable material content of a container by its volume. The fissionable material limit is the limit listed in the table minus twice the absolute value of the error for the measuring equipment used.

f. The thermal power generated by waste materials in any remote-handled, TRU waste package shall not exceed 300 watts. The thermal power is recorded in the data package.

g. Watertight sealed metal (26-gauge minimum wall thickness) or polyethylene containers (0.105-in. minimum thickness) enclosed in a twist/tape or fold/tape closed, or heat sealed and vented 0.020-in.-thick PVC sleeve.

h. Puncture-proof liner (0.100-in. minimum wall, blow-molded polyethylene with 0.06-in. thick minimum, plain disc cover), enclosed in a twist/tape or fold/tape closed, 0.020-in.-thick PVC liner. Puncture-proof liner obtainable from Container Corporation of America, Plastics Division, 30-gal CK Tank No. 1829.

i. A TID is installed on each container by the waste generator.

j. A rigid polyethylene liner, as defined by procurement specification ES-50357, is used inside the UN 1A2 drum.

**4.8.4 Remote- and Contact-Handled, TRU and MTRU to be Stored and Treated at New Waste Calcining Facility (NWCF) HEPA Filter Leaching System (HFLS) and HEPA Filter Storage Area (NWCF-HFLS CPP-659)**

NWCF-HFLS is currently awaiting a regulatory determination from the State of Idaho to prove that no insoluble organic contaminants are present on the filter media after the filters have been treated. The treatment will use chemical extraction (water washing and acid washing) to remove MLLW and MHLW, TRU and alpha-contaminated filter media.

**NOTE:** *The NWCF-NFLS is a way to reduce radiological/TRU waste by treating filter media. Inclusions of WAC into this document is planned for a later date.*

## 4.9 Mixed Transuranic Waste

### 4.9.1 General

In addition to the criteria noted in Subsections 4.8, excepting specified RCRA regulated constituents are allowed with some limitations, 4.6.1, 4.9.2, and 4.9.3, the following acceptance criteria shall apply to all mixed transuranic (TRU) waste to be stored at the Radioactive Waste Management Complex (RWMC).

**NOTE:** *Due to the detail of the WIPP WAC final requirements and the restrictive criteria of TRUPACT-II transportation requirements, the TRU waste GI is contacted at 6-0902 or 6-2954 before generating or packaging TRU waste.*

1. The waste does not contain nonessential hazardous co-contaminants, i.e., hazardous materials that were not essential to the operational activity that generated the waste (INEEL RCRA Permit).
2. The following documentation accompanies each shipment of RCRA-regulated waste: (INEEL RCRA Permit)
  - a. To meet the notification requirements for wastes subject to a nationwide capacity variance under 40 CFR 268.7(a)(3) information for each shipment, as applicable, includes
    - (1) EPA identification number
    - (2) Generator's name
    - (3) Manifest number
    - (4) Waste stream number
    - (5) A list of applicable wastes, with EPA identification number and treatment standards for each constituent
    - (6) Date subject to land disposal prohibitions, if applicable
    - (7) Waste analysis data
    - (8) Proper land disposal restriction (LDR) notification as set forth in 40 CFR 268.32 or RCRA Section 3004 (d), if applicable
    - (9) Generator's signature and date.
  - a. Approved LDR information includes
    - (1) Shipment number
    - (2) Description of waste by an approved code or list of waste constituents
    - (3) A list stating the EPA waste number, treatment standard, and manifest number or line for any waste subject to LDR, if applicable
    - (4) The following statement: "As required by Federal Regulations promulgated by the EPA in 40 CFR 268.7(a)(2)(ii), I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the

**4.9.1 Mixed TRU Waste General  
(continued)**

waste complies with the treatment standards specified in 40 CFR Part 268, Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment. Waste analysis data for these restricted wastes are attached."

- b. EPA Form 8700-22, Uniform Hazardous Waste Manifest (40 CFR 263).
- 3. The waste meets all requirements of Subsection 4.8.1, with the exception that RCRA listed and characteristic waste is allowed as specified in the INEEL RCRA Permit (INEEL RCRA Permit).
- 4. The waste does not contain (INEEL RCRA Permit)
  - a. Incompatible wastes within the same container or on the same pallet (49 CFR 177.848)
  - b. Waste codes not included in the INEEL RCRA Permit.
- 5. Waste packages are provided with proper EPA markings and labels (40 CFR 262.32).
- 6. An onsite evaluation of the generator's facility, waste operations, and documentation will be conducted by the receiving organization after receipt of new IWTS Material and Waste Characterization Profile and for waste streams requiring reapproval (INEEL RCRA Permit, DOE Order 5820.2A).
- 7. Waste is not from a foreign source (INEEL RCRA Permit).

**4.9.2 Contact-Handled, Mixed Transuranic Waste to be Stored at the Radioactive Waste Management Complex**

In addition to meeting all the criteria of Subsection 4.9.1, the acceptance criteria in Subsection 4.8.2, allowing for the RCRA-regulated waste constituents, shall also be met before shipping contact-handled, mixed TRU waste to the RWMC for storage.

**4.9.3 Remote-Handled, Mixed Transuranic Waste to be Stored at the Radioactive Waste Management Complex**

In addition to meeting all the criteria of Subsections 4.9.1 and 4.8.3 allowing for the RCRA-regulated waste constituents, the following acceptance criteria shall also be met before shipping remote-handled, mixed TRU waste to the RWMC for storage.

- 1. Remote-handled, mixed TRU waste, to be stored in the Intermediate Level Transuranic Storage Facility, has been videotaped while being loaded into the waste containers. Videotaping clearly documents physical forms, color, and other important visible characteristics of the waste material (INEEL RCRA Permit).



**4.9.1 Mixed TRU Waste General  
(continued)**

2. Security implications of the video taping requirement are resolved between the waste generator and the regulatory authority (INEEL RCRA Permit).

**4.9.4 Remote- and Contact-Handled, TRU and MTRU to be Stored and Treated at New Waste Calcining Facility (NWCF) HEPA Filter Leaching System (HFLS) and HEPA Filter Storage Area (NWCF-HFLS CPP-659)**

NWCF-HFLS is currently awaiting a regulatory determination from the State of Idaho to prove that no insoluble organic contaminants are present on the filter media after the filters have been treated. The treatment will use chemical extraction (water washing and acid washing) to remove MLLW, HLW, TRU and alpha-contaminated filter media.

**NOTE:** *The NWCF-HFLS is a system that reduces radiological and TRU waste by treating filter media. Inclusion of waste acceptance criteria into this document is planned for a later date.*

**4.9.5 Contact- and Remote-Handled MTRU to be Stored and Treated at NWCF Debris Treatment and Containment Storage Building (CPP-659)**

The debris treatment is available only for a specific <90 day treatment basis. The facility is currently awaiting approval for modifications for the "containment building" to have interim status. Inclusion of *waste acceptance criteria* into this document is planned for a later date.

## **4.10 High-Level Waste**

### **4.10.1 Remote-Handled HLW to be Stored at Calcined Solids Storage Facility (CSSF)**

Capability exists at ICPP to store HLW that has been calcined at the New Waste Calcining Facility (NWCF). The Calcined Solids Storage Facility is used for interim storage of granular solids produced from the calcination process. Eventual treatment is scheduled to occur at Waste Isolation Facility (WIF). Inclusion of the waste acceptance criteria into this document is planned for a later date.

### **4.10.2 Remote-Handled HLW to be Stored and Treated at New Waste Calcining Facility (NWCF CPP-659)**

The NWCF provides storage and partial treatment of HLW, TRU, MLLW, and alpha waste by a calcination process which converts liquid waste to a solid granular form. Calcination is an interim partial treatment and eventually will be treated by WIF. Inclusions of the waste acceptance criteria into this document is planned for a later date.

### **4.10.3 Remote-Handled Liquid HLW to be Treated at NWCF Evaporator Tank System (NWCF HLLWE CPP-659)**

The NWCF HLLWE at ICPP provides partial treatment of HLW by concentrating the waste solution through evaporation of the water in the solution. Evaporation is an interim partial treatment and eventually will be treated by WIF. Inclusion of the waste acceptance criteria into this document is planned for a later date.

### **4.10.4 Remote-Handled HLW to be Stored at ICPP Tank Farm Facility (TFF CPP-602)**

The TFF currently at ICPP provides interim storage of HLW. Inclusion of the waste acceptance criteria into this document is planned for a later date.

### **4.10.5 Remote-Handled HLW to be Stored and Treated at Liquid Effluent Treatment and Disposal and Nitric Acid Recycle Tank (LET&D CPP-1618)**

The LET&D currently at ICPP provides partial treatment of PEW overheads by concentrating liquid in removing the water from the solution by vaporization. Evaporation is an interim partial treatment and eventually will be treated by WIF. Inclusion of waste acceptance criteria into this document is planned for a later date.

### **4.10.6 Remote-Handled HLW to be Stored at Container Storage at D-Cell (CPP-601) and Multicurie Cell (MCC) (CPP-627)**

Inclusion of waste acceptance criteria into this document is planned for a later date.

### **4.10.7 Contact- and Remote-Handled HLW to be Stored and Treated at NWCF Debris Treatment and Containment Storage Building (CPP-659)**

The debris treatment is available only for a specific <90 day treatment basis. The facility is currently awaiting approval for modifications for the "contaminant building" to have interim status. Inclusions of waste acceptance criteria into this document is planned for a later date.

#### **4.10.8 Remote-Handled HLW to be Treated at Waste Immobilization Facility (WIF)**

WIF is a proposed facility at ICPP for processing mixed sodium-bearing waste and calcine. Treatment will use immobilization of HLW and calcine suitable for permanent disposal. Currently the facility is in the planning phases. Inclusion of waste acceptance criteria into this document is planned for a later date.

## 5. REFERENCES

### CODE OF FEDERAL REGULATIONS (CFR)

1. 10 CFR 20.2005, "Standards for Protection Against Radiation," "Disposal of Specific Wastes."
2. 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste."
3. 29 CFR 1910.106, "Occupational Safety and Health Standards."
4. 29 CFR 1910.1200, "Labor," "Hazard Communication."
5. 29 CFR 1910.1450, "Labor," "Occupational Exposure to Hazardous Chemicals in Laboratories."
6. 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants."
7. 40 CFR 61.4, Subpart M, "National Emission Standard for Asbestos," "Definitions."
8. 40 CFR 61.150, "Standard for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation, and Spraying Operations."
9. 40 CFR 61.154, "Standard for Active Waste Disposal Sites."
10. 40 CFR 82.156, "Protection of Stratospheric Ozone, Recycling, and Emissions Reduction, Required Practices."
11. 40 CFR 165.8, "Recommended Procedures for the Disposal of Pesticides."
12. 40 CFR 165.9, "Recommended Procedures for the Disposal of Pesticide Containers and Residues."
13. 40 CFR 173, "Procedures Governing the Recision of State Primary Enforcement Responsibility for Pesticide Use Violations."
14. 40 CFR 243.202-1, "Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste," "Collection Equipment-Requirement."
15. 40 CFR 258.2, "Definitions."
16. 40 CFR 260.10, "Hazardous Waste Management System: General," "Definitions."
17. 40 CFR 261, "Identification and Listing of Hazardous Waste."
18. 40 CFR 261.2, "Definition of Solid Waste."
19. 40 CFR 261.3, "Definition of Hazardous Waste."
20. 40 CFR 261.4, "Exclusions."

**5. References  
(continued)**

21. 40 CFR 261.7, "Residues of Hazardous Waste in Empty Containers."
22. 40 CFR 261.21, "Characteristic of Ignitability."
23. 40 CFR 261.22, "Characteristic of Corrosivity."
24. 40 CFR 261.23, "Characteristic of Reactivity."
25. 40 CFR 261.24, "Toxicity Characteristic."
26. 40 CFR 261, Subpart D, "Lists of Hazardous Waste."
27. 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste."
28. 40 CFR 262, Subpart B, "The Manifest."
29. 40 CFR 262.11, "Hazardous Waste Determination."
30. 40 CFR 262.32, "Marking."
31. 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste."
32. 40 CFR 264.17, "General Requirements for Ignitable, Reactive, or Incompatible Wastes."
33. 40 CFR 264.316, "Disposal of Small Containers of Hazardous Waste in Overpacked Drums (Labpacks)."
34. 40 CFR 265, Appendix V, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" "Examples of Potentially Incompatible Waste."
35. 40 CFR 266, Subpart F, "Recyclable Materials Utilized for Precious Metal Recovery."
36. 40 CFR 266.70, "Recyclable Materials Utilized for Precious Metal Recovery," "Applicability and Requirements."
37. 40 CFR 268, "Land Disposal Restrictions."
38. 40 CFR 268.7, "Waste Analysis and Recordkeeping."
39. 40 CFR 268, Subpart D, "Treatment Standards."
40. 40 CFR 268.32, "Waste Specific Prohibitions - California List Wastes."
41. 40 CFR 268, Appendix III, "List of Halogenated Organic Compounds Regulated Under Part 268.32."
42. 40 CFR 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions."

**5. References  
(continued)**

43. 40 CFR 761.60, "Disposal Requirements."
44. 41 CFR 101-25.109-2, "Federal Property Management Regulations," "Equipment Pools."
45. 41 CFR 101-43, "Utilization of Personal Property."
46. 41 CFR 101-46, "Utilization and Disposal of Personal Property Pursuant to Exchange/Sale Authority."
47. 41 CFR 109-1.520, "DOE Contractors Personal Property Management Program."
48. 41 CFR 109-1.5003, "Definitions."
49. 41 CFR 109-1.5102, "Official Use of Property."
50. 42 CFR 72.3, "Interstate Shipments of Etiologic Agents," "Transportation of Materials Containing Certain Etiologic Agents; Minimum Packaging Requirements."
51. 49 CFR 171.8, "Definitions and Abbreviations."
52. 49 CFR 172, Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements."
53. 49 CFR 172, Subpart D, "Marking."
54. 49 CFR 172, Subpart E, "Labeling."
55. 49 CFR 172.101, "Purpose and Use of Hazardous Materials Table."
56. 49 CFR 172.301, "General Marking Requirements for Non-Bulk Packaging."
57. 49 CFR 172.304, "Marking Requirements."
58. 49 CFR 172.310, "Radioactive Materials."
59. 49 CFR 172.400, "General Labeling Requirements."
60. 49 CFR 172.403, "Radioactive Material."
61. 49 CFR 173, "Shippers - General Requirements for Shipments and Packaging."
62. 49 CFR 173.12, "Exceptions for Shipment of Waste Material."
63. 49 CFR 173.25, "Authorized Packages and Overpacks."
64. 49 CFR 173, Subpart C, "Definitions, Classification, and Packaging for Class 1."
65. 49 CFR 173.410, "General Design Requirements."

**5. References  
(continued)**

66. 49 CFR 173.22a, "Use of Packages Authorized Under Exemptions."
67. 49 CFR 173, Subpart E, "Non-Bulk Packaging for Hazardous Materials Other Than Class 1 and Class 7."
68. 49 CFR 173.216, "Asbestos, Blue, Brown, or White."
69. 49 CFR 173.24, "General Requirements for Packaging and Packages."
70. 49 CFR 173.3, "Packaging and Exceptions."
71. 49 CFR 173.134, "Infectious Substance."
72. 49 CFR 173.403, "Definitions."
73. 49 CFR 173.412, "Additional Design Requirements for Type A Packages."
74. 49 CFR 173.424, "Excepted Packages for Radioactive Instruments and Articles."
75. 49 CFR 173.448, "General Transportation Requirements."
76. 49 CFR 173.475, "Quality Control Requirements Prior to Each Shipment of Class 7 Radioactive Materials."
77. 49 CFR 173.53, "Provisions for Using Old Classifications of Explosives."
78. 49 CFR 177.848 "Segregation of Hazardous Materials."

**DEPARTMENT OF ENERGY (DOE) ORDERS**

79. DOE Order 5480.3, "Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes."
80. DOE Order 5480.5, "Safety of Nuclear Facilities."
81. DOE Order 5700.6, "Quality Assurance."
82. DOE Order 5820.2A, "Radioactive Waste Management."

**DRAWINGS**

83. RWMC Drawing 410205, "RWMC Mark I, 6000 lb, 2 x 4 x 4 and 4 x 4 x 4 Plywood Box Assemblies."
84. RWMC Drawing 410206, "RWMC 12, 800 lb capacity, 2 x 4 x 8 and 4 x 4 x 8 Plywood Box Assemblies."

**5. References  
(continued)**

**ENGINEERING DESIGN FILES (EDFs)**

85. Engineering Design Files (EDFs), RWMC-484, "Summary Report: Waste Concentration Limits for the RWMC."
86. EDF, RWMC-485, "Detail Report: Waste Concentration Limits for the RWMC."
87. WROC-EDF-392 "Radioactive Waste Characterization Requirements for Reactor Generated Low Level Waste."

**FORMS**

88. INEEL form 435.27, "INEEL Landfill Complex Solid Waste Log."
89. INEEL form 435.31, "INEEL Landfill Complex User's Permit."
90. IWTs Material and Waste Characterization Profile.
91. INEEL form series 435.9#-435.13#, "Material and Waste Characterization."
92. IWTs Shipment and Relocation Profile.
93. INEEL form series 435.14#-435.17#, "Shipment Request and Certification."
94. INEEL form 435.2, "No Radioactivity Added Certification."
95. INEEL form 450.17, "Materials Exchange."
96. INEEL form 450.18, "Material Change of Custody."
97. INEEL form 580.07, "Excess Property Report (EPR)".
98. INEEL form 580.31, "Property Review Checklist (Tripwire)".
99. INEEL form 435.25, "Solid Radioactive Waste Forecast"
100. INEEL form 435.35, "Refrigeration/Air Conditioning Appliance Disposal Certification."
101. Certified Waste Data Base System Transuranic Waste Data Base Input form.
102. Environmental Protection Agency Form 8700-22, "Uniform Hazardous Waste Manifest."
103. INEEL form 412.11, "Document Action Request."
104. INEEL form 450.04 "Asbestos Removal Notification Form."



**5. References  
(continued)**

**MANUALS**

- 105. INEEL Packaging and Transportation Safety Manual.
- 106. INEEL Radiological Control Manual, LMITCO Manual 15A or DOE/EH-0256T, Table 2-2.

**MEMORANDUMS**

- 107. T. H. Smith, letter to J. E. Solecki, INEEL Waste Management, Subject: "Accept only certified (CH) or certifiable (RH) TRU waste at the TRU storage facility." "Subsequent to May 1988, only WIPP certified RH-TRU waste will be accepted," May 19, 1987.

**MISCELLANEOUS DOCUMENTS**

- 108. Idaho Administrative Procedures Act (IDAPA) 16.01.01011,04, "Polychlorinated Biphenyls (PCBs)."
- 109. Idaho Administrative Procedures Act (IDAPA) 16.01.05006, "Standards Applicable to Generators of Hazardous Waste," (7-1-93).
- 110. Idaho Solid Waste Management Regulations and Standards, Title 1, Chapter 6, 1-6012.
- 111. INEEL Material Exchange Program.
- 112. International Atomic Energy Agency, Vienna 1981, Technical Report Series 203, *Handling of Tritium Bearing Waste*, January 1981.
- 113. Plant and Equipment Control System (PECOS).
- 114. RWMC, "Radioactive Waste Management Complex Performance Assessment," EGG-WM-8773.
- 115. RWMC "Soil Vault Criticality Safety Evaluation," Report Number SD-C-80-005, June 1980.
- 116. Toxic Substances Control Act (TSCA).
- 117. DOE-HQ Program Guidance to DOE-ID, 1987.
- 118. DOE-ID-10333, *Pollution Prevention Plan*, U.S. Department of Energy Idaho Falls, ID.

**MISCELLANEOUS FEDERAL GOVERNMENT DOCUMENTS**

- 119. Environmental Protection Agency (EPA), "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods," SW-846.
- 120. EPA/625/7-88/003, "Waste Minimization Opportunity Assessment Manual."
- 121. Executive Order 12344, "Naval Nuclear Propulsion Program" Dated 2/1/82.

**5. References  
(continued)**

- 122. Federal Property Management Regulation 101-42.
- 123. Federal Register, 55 FR 106, "Land Disposal Restrictions for Third Scheduled Wastes; Rule," June 1, 1990, p. 22534.
- 124. TRUPACT-II Authorized Methods for Payload Control (TRAMPAC).

**PERMIT APPLICATIONS**

- 125. INEEL RCRA Part A Permit Application.
- 126. MWSF RCRA Part B Permit Application.
- 127. WERF RCRA Part B Permit Application.

**PERMITS**

- 128. HWSF RCRA Part B Permit.
- 129. INEEL Landfill Complex, Idaho DEQ Air Quality Permit.
- 130. RWMC RCRA Part B Permit.

**SAFETY ANALYSIS REPORTS (SARs)**

- 131. Mixed Waste Storage Facility, Safety Analysis Report (MWSF SAR).
- 132. Radioactive Waste Management Complex, Safety Analysis Report (RWMC SAR)
- 133. Test Area North 547, Safety Analysis Report (TAN-647 SAR).
- 134. Waste Experimental Reduction Facility, Safety Analysis Report (WERF SAR).
- 135. Waste Experimental Reduction Facility (WERF) Technical Safety Requirements Document (MW-F1-81-026).

**SPECIFICATIONS**

- 136. ES-50338 Rev. E, July 5, 1994. Liner, plastic, radioactive waste, 4 ft x 4 ft x 4 ft container VWP-572027; ES-50339 Rev. E, July 5, 1994. Liner, plastic, radioactive waste, 4 ft x 4 ft x 8 ft container VWP-572026; or ES-50340 Rev. E, Liner, July 5, 1994. Plastic, radioactive waste, 2 ft x 4 ft x 8 ft container VWP-572028.

**STANDARDS**

- 137. ANSI/ANS, 1981, "Nuclear Criticality of Special Actinide Elements," ANSI/ANS, American National Standards Institute/American Nuclear Society 8.15-1981.

**5. References  
(continued)**

138. ASME, 1989, *Quality Assurance Program Requirements for Nuclear Facilities*, ASME-NQA-1-1989 Edition, The American Society of Mechanical Engineers, New York, NY.
139. ASTM, 1982, "Evaluation of Fire-Retardant Paints for Use at the INEEL," ASTM, American Society for Testing and Materials, E-84, WM-F1-22-005, 1982.
140. DEQ 1992, "Guidelines for TPH Analysis of Petroleum Contaminated Soils," Idaho Department of Health and Welfare, Division of Environmental Quality (DEQ), Division of Community Programs.
141. ASTM Designation E 181-93, Standard General Methods for Detector Calibration and Analysis of Radionuclides.
142. ASTM Designation C 1000-90, Standard Test Method for Radiochemical Determination of Uranium Isotopes in Soil by Alpha Spectrometry.
143. ASTM Designation C 1001-90, Standard Test Method for Radiochemical Determination of Plutonium in Soil by Alpha Spectrometry.
144. ASTM Designation C 1205-91, Standard Test Method for the Radiochemical Determination of Americium-241 in Soil by Alpha Spectrometry.
145. ANSI N42.14-1991, American National Standard Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides.
146. DOE-STD-1090-96, DOE Standard Hoisting and Rigging.

**WASTE ACCEPTANCE CRITERIA**

147. Waste Isolation Pilot Plant Waste Acceptance Criteria (WIPP WAC).

**Section J**

**Attachment J-M**

**LABOR AGREEMENTS**

## LABOR AGREEMENTS

ADDRESS:

<http://www.id.doe.gov/doiid/m&o/PDF/OCAW/AppendixC.pdf>

<http://www.id.doe.gov/doiid/m&o/PDF/OCAW/Appendixb.pdf>

<http://www.id.doe.gov/doiid/m&o/PDF/OCAW/ssappena.pdf>

<http://www.id.doe.gov/doiid/m&o/PDF/OCAW/Agreement.PDF>

<http://www.id.doe.gov/doiid/m&o/PDF/OCAW/Site%20ConstructionAg.PDF>

# INEL SITE STABILIZATION AGREEMENT

DEPARTMENT OF ENERGY

IDAHO NATIONAL ENGINEERING LABORATORY

IDAHO FALLS, IDAHO

First Edition  
November 1, 1984

Second Edition  
October 1, 1991

DETERMINATION PURSUANT TO THE ACT OF AUGUST 28, 1958,  
72 STAT. 972 PUBLIC LAW 85-804 (50 U.S.C. 1431-35)

WHEREAS, a construction site labor agreement entitle "INEL Site Stabilization Agreement," applicable to the portions of the Idaho National Engineering Laboratory administered by the Idaho Operations Office of the United States Department of Energy, has been executed by Morrison-Knudsen Co., Inc., Catalytic, Inc., and other construction companies performing work at INEL and the Building and Construction Trades Department of the AFL-CIO, the International Unions affiliated therewith, and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America.

WHEREAS, the Department of Energy has concluded that adherence to certain conditions of employment set forth in the aforementioned labor agreement (including, where applicable, the requirement set forth in that Agreement to become a party signatory) by all contractors and subcontractors performing work, under contracts and subcontracts which are made subject to the Davis-Bacon Act at the Idaho Operations Office (DOE-ID) administered areas at the Idaho National Engineering Laboratory of the Department of Energy, will promote stability, efficiency, and economy of performance of contracts and subcontracts which directly affect the national defense; and,

WHEREAS, prompt, orderly, and economic performance of such work may be seriously impeded by failure to require adherence to the contract clause attached hereto as Attachment No.I, and by reference made a part of this Determination.

Therefore, pursuant to authority of Public Law 85-804 vested in the Secretary of the U.S. Department of Energy, by Executive Order 10789, as amended, it is determined necessary in order to facilitate the national defense to include a clause in all DOE-ID administered contracts, and subcontracts thereunder, and amendments and modifications thereof, which are made subject to the Davis-Bacon Act at the Idaho National Engineering Laboratory, requiring that such contractors and subcontractors shall adhere to certain conditions of employment as set forth in the contract clause attached hereto as Amendment I.

The Manager, Idaho Operations Office, is authorized (1) to modify Attachment I from time to time, and (2) to direct contractors to pay amounts for wages, fringe benefits, and other employee compensation as the INEL Site Stabilization Agreement, including its Appendices A, may be modified from time to time.

s/Donald Paul Hodel  
Secretary of Energy

January 16, 1985  
Date

## ATTACHMENT I

PROVISIONS FOR CONSTRUCTION CONTRACTS AND SUBCONTRACTS ADMINISTERED BY THE IDAHO OPERATIONS OFFICE OF THE UNITED STATES DEPARTMENT OF ENERGY WHICH ARE SUBJECT TO THE DAVIS-BACON ACT AND PERFORMED AT THE IDAHO NATIONAL ENGINEERING LABORATORY

(a) The INEL Site Stabilization Agreement, which is referenced in this Attachment I and attached hereto, consists of a Basic Agreement dated November 1, 1984 signed by Morrison-Knudsen Co., Inc., Catalytic, Inc., and other construction companies performing work at INEL and the Building and Construction Trades Department of the AFL-CIO; the International Unions affiliated therewith; and the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America.

(b) This Attachment I applies to employees performing work, under contracts or subcontracts administered by the Idaho Operations Office of the U.S. DOE (DOE-ID) which are subject to the Davis-Bacon Act, in the classifications set forth in the Agreement for work performed at the Idaho National Engineering Laboratory (INEL).

(c) Contractors and Subcontractors at all tiers who are parties to agreement(s) for construction work performed at the INEL, or who are parties to a national labor agreement for such construction work, shall become signatory to the Agreement and shall abide by all of its provisions, including its Appendices A. Subcontractors at all tiers who have subcontracts with a signatory Contractor or Subcontractor shall become signatory to the Agreement and shall abide by all its provisions, including its Appendices A.

(d) Contractors and Subcontractors at all tiers who are not signatory to the Agreement and who are not required under paragraph (c) above to become signatory to the Agreement, shall pay not less and no more than the wages, fringe benefits, and other employee compensation set forth in Appendices A to the Agreement and shall adhere, except as otherwise directed by the Contracting Officer, to the following provisions of the Agreement:

- |     |               |                                      |
|-----|---------------|--------------------------------------|
| (1) | Article VIII  | Equal Employment Opportunities       |
| (2) | Article X     | Nonsignatory Contractor Requirements |
| (3) | Article XI    | Coordinator                          |
| (4) | Article XVI   | General Work Rules                   |
| (5) | Article XVII  | Hours of Work                        |
| (6) | Article XVIII | Application of Appendix A            |
| (7) | Article XXII  | Standing Board of Adjustment         |
| (8) | Appendix A    | Wage Rates                           |
| (9) | Appendix C    | Employee Notification                |



(e) The Contractor agrees that contributions in connection with this contract to Industry Promotion Funds, or similar funds, will not be allowable costs under this Contract.

(f) The obligation of the Contractor and his Subcontractors to pay fringe benefits shall be discharged by making payments required by this Contract in accordance with the provisions of the amendments to the Davis-Bacon Act contained in the Act of July 2, 1964 (Public Law 88-349-78 Stat. 238-239), and the Department of Labor regulations in implementation thereof (29 CFR, Parts 1, 5).

(g) The Contracting Officer may, from time to time, direct the Contractor to pay the amounts for wages, fringe benefits, and other employee compensation as the INEL Site Stabilization Agreement, including its Appendices A, may be modified by the parties thereto from time to time.

(h) (1) In the event of failure to comply with paragraphs (c), (d), (e), (f), and (g) above, or failure to perform any of the obligations imposed upon the Contractor and his Subcontractors hereunder, the Contracting Officer may withhold any payments due to the Contractor and may terminate the Contract for default.

(2) The rights and remedies of the Government provided in this Attachment I shall not be exclusive and are in addition to any other rights and remedies of the Government provided by law or under this Contract.

(i) The requirements of this Attachment I are in addition to, and shall not relieve the Contractor of any obligation imposed by other clauses of this Contract, including those entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act - Overtime Compensation," "Payrolls and Basic Records," "Compliance with Copeland Act Requirements," "Withholding," and "Contract Termination: Debarment."

(j) The Contractor agrees to maintain his bid or proposal records showing rates and amounts used for computing wages and other compensation, and his payroll and personnel records during the course of work subject to this Attachment I, and preserve such records for a period of three years thereafter, for all employees performing such work. Such records will contain the name and address of each such employee, his correct classification, rate of pay, daily and weekly number of hours worked, and dates and hours of the day within which work was performed, deductions made, and amounts for wages and other compensation covered by paragraphs (c), (d), (e), (f), and (g) hereof. The Contractor agrees to make these records available for inspection by the Contracting Officer and will permit him to interview employees during working hours on the job.

(k) The Contractor agrees to insert the provisions of this Attachment I, including this paragraph (k), in all subcontracts for the performance of work subject to the Davis-Bacon Act at the Idaho Operations Office administered portions of the INEL.

10/01/91

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ATTACHMENT - Footnoted of Interpretation and Clarification...53-61

THIS AGREEMENT is made and entered into this 19th day of June, 1984, by and between the Contractors and Subcontractors signatory to this AGREEMENT, hereinafter referred to as "EMPLOYERS," performing construction work (determined to be covered by the Davis-Bacon Act by the OWNER), and the Building and Construction Trades Department of the AFL-CIO, the Idaho Building and Construction Trades Council and the International Unions affiliated therewith signatory hereto, the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America and the signatory local unions, hereinafter collectively called "UNIONS."

**ARTICLE I**  
**BARGAINING AGENT**

The EMPLOYERS are the principals and do not act as the agent of or bind the OWNER for any purpose relating to or arising out of the terms and conditions hereof. Each UNION signatory hereto agrees that it will confer and negotiate only with the EMPLOYERS or their duly authorized representatives on all matters in the administration, interpretation, and enforcement of the terms of this AGREEMENT.

In the event of any violation of the terms of this AGREEMENT, the responsible and authorized representative of the UNIONS signatory hereto, or EMPLOYER, as the case may be, shall promptly take such affirmative action as is within their power immediately to correct and terminate the violation.

**ARTICLE II**  
**PREAMBLE**

The parties to this AGREEMENT recognize that the work covered by this AGREEMENT is specialized and unique construction requiring long periods of time, large scale capital outlays, exacting construction and performance standards including protection of the health and safety of the public and EMPLOYEES and a need for higher labor skills for many operations and complex managerial organizations. The careful planning and scheduling of work operations can make a major contribution in this circumstance to cost reduction and more rapid job completion. The parties further recognize the national importance of the INEL mission in assuring adequate supplies of energy for economic growth and national defense, the creation of job opportunities and for a greater degree of energy independence in the national interest. The parties believe that this AGREEMENT constitutes a vital contribution to the achievement of the objectives of national defense and a national energy policy.

It has been determined necessary, pursuant to the authority of Public Law 85-804, vested in the Secretary of the Department of Energy by Executive Order 10789, to facilitate such national defense and national interest to include a clause in OWNER contracts and subcontracts thereunder and amendments and modifications thereof, for the performance of work under contracts and subcontracts which are subject to the Davis-Bacon Act within the TERRITORY requiring such contractors to pay the money provisions of this AGREEMENT.

This AGREEMENT is to aid in the elimination of construction delays attributed to labor-management issues, and increasing the opportunity for more effective planning of work operations by contractors. The AGREEMENT is uniquely a full and complete SITE STABILIZATION AGREEMENT that does not depend on other collective bargaining agreements in the construction industry whether local, regional or national in scope except as defined herein. The parties agree to abide by the terms and conditions of employment set forth in this AGREEMENT and to resolve any questions or any dispute in accordance with the procedures specified in this AGREEMENT without strike, lockout or other interruption of work operations. Additional contractors or association of contractors may become parties to this AGREEMENT for all construction work encompassed by this AGREEMENT.

### **ARTICLE III** **TERRITORY**

This AGREEMENT shall cover all OWNER contracts or subcontracts for the performance of construction work at the actual site of construction, within the geographic confines of the Idaho National Engineering Laboratory.

### **ARTICLE IV** **OWNER**

The OWNER, for the purpose of this AGREEMENT, shall be the U.S. Department of Energy, (DOE), or successor agency.

### **ARTICLE V** **SCOPE OF AGREEMENT**

The terms of this AGREEMENT shall not apply to work of the EMPLOYER being performed under the terms of the National Tank Manufacturers' Agreement, the Stack Agreement, or the Cooling Tower Agreement. In the event of a conflict between any provisions of this AGREEMENT and those existing in any other national or local agreements, the terms of this AGREEMENT will be applied and shall prevail.

The deliveries of equipment, apparatus, machinery and construction material to the site of construction shall not be within the scope of this AGREEMENT until such equipment, apparatus, machinery and construction material is placed in the possession and control of an EMPLOYER bound by the terms of this AGREEMENT.

The handling of construction materials at the railhead and to the project shall be the work of the appropriate craft. Providing, however, that nothing herein shall limit the use of common carriers for the handling, transporting and warehousing of the OWNER'S materials and equipment.

The handling of excess construction materials at the jobsite and to the OWNER'S designated storage point shall be the work of the appropriate craft.

**ARTICLE VI**  
**MANAGEMENT RIGHTS**  
**(Footnote #20)**

The EMPLOYER retains full and exclusive authority for the management of his operations. Except as expressly limited by other provisions of this AGREEMENT, the EMPLOYER may direct his working forces, at his sole prerogative, including hiring or termination for just cause of his EMPLOYEES. No rules, customs, or practices shall be permitted or observed which limit or restrict production or limit or restrict the joint or individual working efforts of EMPLOYEES. The EMPLOYER may utilize any methods or techniques of construction and there shall be no limitations or restrictions on the use of machinery, pre-cast materials, equipment, tools or other labor-saving devices, nor shall there be any limitations upon choice of materials, equipment or design. The EMPLOYER shall assign and schedule work and shall determine when overtime will be worked and may require reasonable overtime. The EMPLOYER has the right to establish and enforce reasonable work rules for the job and to refuse to rehire anyone terminated for cause. The EMPLOYER shall retain all existing rights of management and all rights conferred on it by law. EMPLOYERS shall therefore have no restrictions, except those specifically provided for in this AGREEMENT.

**ARTICLE VII**  
**NO STRIKES - NO LOCKOUTS**

The UNIONS, the EMPLOYERS, and the EMPLOYEES, individually, realize the importance to all parties of the uninterrupted performance of the work within the TERRITORY.

The EMPLOYEES will not strike, engage in any picketing, sympathy strikes, sit-downs, stand-ins, slowdowns, wobbles, walk offs, mass resignations, or other refusals to work, and will refuse to honor any picket line established by anyone, whether parties to this AGREEMENT or otherwise, and will not make any attempt of any kind to dissuade others from making deliveries to or performing services for or otherwise doing business within the TERRITORY.

The UNIONS will not encourage, or condone any picketing, strikes, sympathy strikes, sit-downs, slow-downs, stand-ins, wobbles, mass resignations, walk-offs or other refusals to work of any kind, or attempts to dissuade others from making deliveries to the TERRITORY from performing services for, or otherwise doing business within the TERRITORY, and if such prohibited activities occur the UNIONS will take all reasonable and necessary actions to end such prohibited activities.

There shall be no lockout by the EMPLOYER, however, in the event of a strike over local or area contract negotiations, it will not be considered a violation of this AGREEMENT for the EMPLOYER(S) to stop work covered by this AGREEMENT for the duration of a strike or from shutting down all or part of the work within the TERRITORY in such event provided notification is given to the appropriate UNION(S) a minimum of five (5) working days prior to taking such action. In addition, in the event of a strike over local or area contract negotiations, it will not be considered a violation of this AGREEMENT for the UNION(S) to refuse to furnish men to the EMPLOYER(S) for the duration of the strike provided notification is given to the appropriate EMPLOYER(S) a minimum of five (5) working days prior to taking such action, and provided the UNION(S) agree not to picket within the TERRITORY or otherwise attempt to dissuade others from the performance of work on the Project, or from making deliveries thereto, or from performing services or otherwise doing business within the TERRITORY. Such

notification may be given a minimum of five (5) working days prior to the expiration of the local or area agreement.

Any EMPLOYEE who participates in or encourages any activities which interfere with the normal operations within the TERRITORY shall be subject to injunctive action and disciplinary action including discharge. The UNION shall not be liable for acts of EMPLOYEES for which it has no responsibility.

The UNIONS further agree that if any UNION or any other persons, whether parties to this AGREEMENT or otherwise, engage in any picketing or work stoppage, the UNIONS shall consider such work stoppage or picketing to be illegal, and will refuse to honor such picket line or work stoppage. The UNION agrees that it will not permit or condone any sympathy strike by its members for any reasons.

No provisions in any existing or future local or area collective bargaining agreement shall be deemed to limit or restrict the EMPLOYER'S right to fully pursue any and all remedies available under law in the event of a violation of this Article.

In lieu of, or in addition to, any other action any signatory party to this AGREEMENT, may initiate Grievance Procedure Step 3 when a breach of this article is alleged.

#### **ARTICLE VIII** **EQUAL EMPLOYMENT OPPORTUNITY**

It is agreed that affirmative action shall be taken to afford equal employment opportunity to all qualified persons without regard to age, race, creed, color, sex or national origin; further, equal employment opportunity shall be given to Vietnam era veterans and handicapped persons. This commitment shall be applicable to all matters relating to hiring, training, promotion, transfer, or termination of EMPLOYEES. Furthermore, the parties agree to cooperate to the fullest extent to achieve the intent and purposes of Title VII, Civil Rights Act of 1964 as amended and Executive Order 11246 or such laws or executive orders as may supersede them.

#### **ARTICLE IX** **SIGNATORY CONTRACTOR REQUIREMENTS**

Any contractor or his subcontractor at any tier who is party to agreements for construction work with Local Union(s) having jurisdiction over the type of work being contracted under this AGREEMENT, or party to a National Labor Agreement for such construction work, shall become signatory to this AGREEMENT for all work covered in such contracts or subcontracts. Provision will be made for any such EMPLOYER or subcontractor at any tier to sign and fully comply with this AGREEMENT for all work covered by its contract or subcontracts performed at the site of construction, provided that this SITE STABILIZATION AGREEMENT shall apply within the TERRITORY only.

If any EMPLOYER or his subcontractor at any tier who is signatory to this AGREEMENT subcontracts the performance of any work, written provision shall be made within the subcontract for compliance by the subcontractor with all the terms and provisions of this AGREEMENT. In conformity with such obligation, any EMPLOYER or subcontractor shall indicate his acceptance of the terms and conditions of this AGREEMENT as governing work within the TERRITORY by signing the EMPLOYERS Signature Sheet provided for this purpose and delivering a copy

thereof to the COORDINATOR and to the appropriate UNIONS prior to his commencement of any work within the TERRITORY.

The UNIONS agree that the provisions, conditions and benefits hereof shall be extended to all EMPLOYERS and subcontractors at any tier insofar as work within the TERRITORY is concerned, provided only that such contractors or subcontractors shall become signatory to this AGREEMENT.

Any EMPLOYER, subcontractor, or UNION who becomes a party to this AGREEMENT as provided above shall alone be liable and responsible for his own individual acts and conduct and for any breach or alleged breach of this AGREEMENT by him, and shall not have any imputed responsibility or liability for any breach of another EMPLOYER, subcontractor or UNION. Any alleged breach of another EMPLOYER, subcontractor, or UNION or any dispute between a UNION and any EMPLOYER, any subcontractor or other UNION respecting compliance within the terms herein shall not affect the rights, responsibilities, obligations, and duties between the UNION, EMPLOYERS or subcontractors at any tier who are party to this AGREEMENT. The liability of the separate UNIONS, EMPLOYERS and subcontractors under this AGREEMENT shall be several and not joint.

#### ARTICLE X NON-SIGNATORY CONTRACTOR REQUIREMENTS

Nothing in this AGREEMENT shall be construed to limit the OWNER'S right to make selection for purposes of awarding construction contracts or material purchase orders within the TERRITORY, and the right of refusal remains solely with the OWNER. If such award is to a contractor which is not signatory to a union agreement covering such work, then such contractor and his non-signatory subcontractors shall not be obligated to become signatory to this AGREEMENT.

Nothing herein shall be construed to limit the right of the UNIONS to engage in lawful organizational efforts to organize the EMPLOYEES of non-signatory contractors or subcontractors.

Subcontractors signatory to an existing Union Agreement covering work under a contract with a non-signatory contractor will be required to execute this AGREEMENT in accordance with the requirements for signatory contractors.

It is acknowledged, however, that the OWNER shall make provisions in contracts which are subject to the Davis-Bacon Act within the TERRITORY, to pay to or for the account of their EMPLOYEES in the classifications set forth, not less than the wages and other compensation including, but not limited to, fringe benefits, overtime premiums, and per diem as provided by this AGREEMENT, and the Appendix A of this AGREEMENT. The obligation of such contractor or his subcontractor to pay fringe benefits shall be governed by making the payments in accordance with the provisions in the amendments to the Davis-Bacon contained in the Act of July 2, 1964, (Public Law 88-349) in the Department of Labor Regulations and implementation thereof (29 CFR, Parts 1,5), but shall not limit his obligation to provide other compensation as provided above. The Contracting Officer of the OWNER shall, from time to time, direct all contractors and subcontractors on the work subject to the Davis-Bacon Act within the TERRITORY, to pay amounts for wages and other compensation as this AGREEMENT may be modified from time to time.

**ARTICLE XI**  
**COORDINATOR**  
Footnote #1; #18)

Duties of the COORDINATOR shall include acting as a neutral party in providing advice and assistance to the UNIONS, EMPLOYERS, the Grievance Board of Adjustment, the Standing Board of Adjustment and the Executive Committee.

**ARTICLE XII**  
**SUBCONTRACTING**

A subcontractor is any person, firm or corporation or other business entity who takes over or performs any portion of the construction work to be done at the site of the construction, alteration, painting or repair of a building, structure or any other work.

A signatory EMPLOYER shall not subcontract or otherwise transfer in whole or in part any construction work covered by this AGREEMENT to be done at the site of the construction, alteration, painting or repair of a building, structure, or other work unless the person, firm, corporation or other business entity is signatory to this AGREEMENT.

The furnishing of materials, supplies, or equipment and the delivery thereof shall in no case be considered subcontracting.

For procurements under the control of the signatory EMPLOYER, fabrication provisions of the appropriate National craft agreements will be recognized. The OWNER may purchase equipment and material from any source without any restriction and the UNION will install the equipment and materials in an efficient, workman-like manner.

**ARTICLE XIII**  
**RECOGNITION**

This AGREEMENT shall govern the employment of workmen who are employed on the project by any signatory employer within the recognized historical and traditional craft jurisdiction of the signatory UNIONS, as the same is defined by the Building and Construction Trades Department AFL-CIO as of the date of this AGREEMENT.

Signatory EMPLOYERS hereby recognize the UNIONS as the sole and exclusive bargaining agents for workmen so employed, subject however to such exclusions as may be incorporated in local area bargaining contracts of the respective Unions within the boundaries of the Idaho Building trades Council.

It is understood that this Agreement does not cover:

Executives  
Professional Engineers and their Helpers (Subject to Appendix A)  
Superintendents  
Assistant Superintendents  
Inspectors  
Time Keepers  
Messengers  
Clerical Workers  
Any EMPLOYEES of any EMPLOYER above the position of Craft General Foreman



This AGREEMENT shall apply only to construction craftsmen represented by any UNION signatory hereto and shall not apply to other field personnel or to non-manual employees.

This AGREEMENT recognizes that where a legitimate manufacturer's warranty is involved, the UNION(S) agree to work under the direction of a manufacturer's representative unless expressly prohibited by the manufacturer's published standards.

Testing or inspection of equipment, apparatus or systems of the OWNER shall be considered covered by this AGREEMENT. After such OWNER'S acceptance of and physical possession of such equipment, apparatus, system, facility or component it shall not be considered work covered by this AGREEMENT. However, any deficiencies found during or after SO testing shall be performed under the terms of this AGREEMENT.

ARTICLE XIV  
HIRING PROCEDURES  
Footnote #13; #14)

Any EMPLOYER signatory hereto agrees to be bound by the hiring procedures of the local unions signatory hereto, not inconsistent with the terms of this AGREEMENT. Applicants referred to a job shall report to the EMPLOYER'S office established for that job. It is understood that employment begins and ends at the jobsite, except for the initial security check-in.

The EMPLOYER shall not pay for time spent preparing necessary forms to obtain a security clearance. However, a reasonable time will be allowed each employee for initial security check-in at time of initial hire or re-hire.

The UNIONS agree to furnish at all times to the EMPLOYER qualified journeymen and apprentices in a sufficient number, as determined by the EMPLOYER, per the ratios defined in the appropriate Appendix A s as may be necessary under the terms specified in this AGREEMENT. If, upon request, the UNION is unable, within forty-eight (48) hours (Saturday, Sunday and Holidays excluded), to supply workmen, including workmen with special skills or qualification, the EMPLOYER may secure workmen from any other source.

The EMPLOYER shall have the right to reject any applicant for just cause referred by the UNION.

ARTICLE XV  
UNION SECURITY  
Footnote #25: #31)

All EMPLOYEES covered by this AGREEMENT and coming under the jurisdiction of the UNIONS, as set forth in the Recognition Clause, Article XIII, shall, as a condition of employment, become members of the appropriate UNION within eight (8) days following the date of their employment, and shall remain members in good standing during the term of this AGREEMENT. Good Standing for the purpose of this AGREEMENT is interpreted to mean the payment or tender of initiation fees and Union dues uniformly required as a condition of acquiring or retaining membership. When an EMPLOYEE fails to tender to an authorized agent of the UNION such initiation fees or UNION dues as are required for good standing membership, the EMPLOYER will, upon written request from the UNION, terminate the EMPLOYEE immediately, unless it interferes with the contractor's efficiency of operation but no later than the end of the shift. Such written request from

the UNION shall certify the delinquency, one copy to be mailed or delivered to the project superintendent of the EMPLOYER, one copy to the delinquent EMPLOYEE, and the third copy to the COORDINATOR.

The EMPLOYER will notify the UNION as soon as possible, as well as the COORDINATOR, of the date of hire of any newly employed EMPLOYEES covered by this AGREEMENT who were not referred by the UNION.

**ARTICLE XVI**  
**GENERAL WORK RULES**  
(Footnote #7; #17)

1. There shall be no limit on production by EMPLOYEES, including working foremen, nor restrictions on the full use of tools or equipment. EMPLOYEES using tools shall perform any of the work of the trade and shall work under the direction of the foremen. There shall be no restrictions on efficient use of manpower other than as may be required by safety regulations.

2. Slowdowns, standby crews and make work practices shall not be tolerated. There will be no standby crews or EMPLOYEES for standby purposes.

3. The welding equipment and chain falls are tools of the trade having jurisdiction over the work being performed. EMPLOYEES using these tools shall perform any of the work of their trade.

4. The EMPLOYER shall determine the need for overtime and will have the specific right to assign EMPLOYEES to work overtime, including the use of partial crews. The EMPLOYER will designate which EMPLOYEES will work any and all overtime. If overtime is worked, the EMPLOYER will make a reasonable effort to distribute overtime on an equitable basis wherever practicable. Upon request of the UNION the steward shall be included in overtime crews, if qualified.

5. All foremen will remain with their crews and supervise them in the performance of their assigned duties. Foremen will not absent themselves from the area where their crews are working unless their presence is required elsewhere. (7)

6. Any EMPLOYEE who reports for work under the influence of alcoholic beverages or drugs, or who drinks alcoholic beverages or uses illicit drugs on the work site or who reports to the work site with alcoholic beverages or non-prescribed drugs or firearms in his possession, shall be subject to immediate termination.

7. Any EMPLOYEE who willfully damages the work of any other EMPLOYEE, or any material, equipment, tools, apparatus, or machinery shall be subject to immediate termination.

8. The second time an EMPLOYEE fails to give timely notice of absence on a job he may be terminated as a quit. Chronic absenteeism or tardiness will be cause for discharge.

9. Local practices not a part of this AGREEMENT shall not be recognized.

10. There shall be no tenure. Continuing employment is contingent upon the skill, productivity and qualification of the EMPLOYEE. (17)

11. The UNION will not impose conditions which require the EMPLOYER(S) to employ more EMPLOYEES than the EMPLOYER(S) deem necessary to perform the work.

12. The selection of foremen and general foremen, including the number of and type required, shall be entirely the responsibility of the EMPLOYER, it being understood that the selection of such foremen and general foremen shall be limited to individuals hired through the hiring procedure. Foremen and general foremen shall take orders from individuals designated by the EMPLOYER. (7)

Nothing contained herein shall be construed to limit the EMPLOYER'S rights established in Appendix A relative to the selection, call and hiring of foremen and general foremen.

13. The parties reaffirm their policy of a fair day's work for a fair day's pay. Any violation of the work starting and stopping times will be grounds for termination. EMPLOYEES shall be at the place of work designated by the EMPLOYER at the starting time and shall remain at their place of work until quitting time except where the OWNER'S security and/or job requirements require EMPLOYEES to report to work or quit their work at different locations. Special considerations may be given to unusual conditions. The EMPLOYER agrees to provide adequate time at the end of each shift for picking up tools.

14. There will be no organized break or rest period during working hours for any EMPLOYEES covered by this AGREEMENT. However, EMPLOYEES will be permitted to have a personal thermos bottle of coffee to be consumed during scheduled working hours, not to exceed ten (10) minutes per four (4) hour shift, at the designated work place, unless prohibited by safety, health and security conditions. Violation or abuse of this provision shall be cause for discharge.

15. Adequate facilities will be provided for EMPLOYEES in which to dry their clothes and to eat their lunches. These facilities shall be adequately heated and ventilated and shall not be used for storing supplies, tools or equipment to the extent that the facilities are rendered unsuitable for the intended use.

16. No premium pay, other than overtime, will be recognized under this AGREEMENT.

17. Upon initial employment a list of any EMPLOYEE'S personal tools will be furnished to the EMPLOYER. Such list will be verified by the EMPLOYER'S representative by inventorying said tools. This list shall be updated upon the EMPLOYEE adding to or subtracting from his personal tools on the job and be verified by EMPLOYER'S representative. Upon termination from the job, the tool list shall be verified by EMPLOYEE and EMPLOYER representative.

18. There shall be no limit to the number of work classifications or pieces of equipment EMPLOYEES can work within their craft when qualified to perform the work.

19. Tool boxes, lunch boxes, vehicles, and other personal property may be subject to periodic unannounced inspection while within the TERRITORY.

20. A pay day shall be established once a week with no more than three (3) days held back.

21. The EMPLOYER agrees to deduct - upon receipt of a voluntary written authorization - funds from the earnings of each EMPLOYEE, only as provided for

in Appendix A. Such amount shall be certified to the EMPLOYER by the Local Union upon request by the EMPLOYER.

**ARTICLE XVII**  
**HOURS OF WORK**

(Footnote #12; #16; #19; #21; #22; #23; #27; #30; #32)

**1. Normal Work Day**

The normal work day shall be eight (8) hours and the normal work week shall be forty (40) hours, Monday through Friday, provided however that nothing herein shall be construed as guaranteeing any EMPLOYEE eight (8) hours of work per day or forty (40) hours work per week. A single shift shall consist of eight (8) hours of continuous employment, except for unpaid lunch period, between the hours of 7:00 a.m. and 6:00 p.m.

**2. Shift Work**

Shifts may be established when considered necessary by the EMPLOYER.

**a. Shift hours will be as follows:**

The first shift (day shift) - Eight hours pay for eight (8) hours work, plus unpaid lunch period. The first shift shall be worked between the hours of 7:00 a.m. and 6:00 p.m.

The second shift (swing shift) - Eight hours pay for seven and one-half (7-1/2) hours work, plus unpaid lunch period. The second shift shall be worked between the hours of 4:00 p.m. and 2:00 a.m.

The third shift (graveyard shift) - Eight (8) hours pay for seven (7) hours work, plus unpaid lunch period. The third shift shall be worked between the hours of 11:00 p.m. and 9:00 a.m.

**b.** Shifts shall be established and continue for a minimum of five (5) consecutive work days or applicable overtime rate will be paid. If Saturday and/or Sunday are worked, they shall be included in the five(5) day minimum period.

**c.** The interval between shifts worked in the same day shall not exceed the reasonable time necessary to change shift and in no event shall such interval exceed one (1) hour.

**d.** Overtime rates shall be applicable to shift differential. The EMPLOYER shall have the right to establish a shift or shifts consisting of ten (10) hours of work, exclusive of a non-paid lunch period per day. The first eight (8) hours of work on these shifts shall be paid for at the basic straight time hourly wage rate. The last two (2) hours of work up to ten hours of work, shall be one and one-half (1 1/2) times the basic straight time hourly wage rate.

Fringe benefit payments shall be paid only on the basis of compensable hours except where this is in violation of the applicable trust agreement, in which case the provisions of the trust agreement will prevail.

Saturdays - The first ten (10) hours of work performed on Saturday shall be paid at the rate of one and one-half (1-1/2) times the basic straight time hourly

wage rate. After ten (10) hours of work, the rate shall be two (2) times the basic straight time hourly wage rate.

Sundays and Holidays - Work performed on Sundays or on holidays as designated in Article XVII, Section 6, shall be paid at the rate of double the straight time hourly wage rate.

### 3. Alternating 4 Ten-Hour Shift Operation

Under this operation the day shift manual work force is organized into two teams. The "A" team works 4 consecutive 10 hour days. On the fifth day the "B" team continues the work activities for 4 consecutive 10 hour days. On the ninth day the "A" team returns to work to continue the construction activities. The 4-day alternating "A" and "B" team operation can continue on a year-round basis. The same pattern applies for a second shift. Appendix B further illustrates the application of these provisions. If two shifts are established, they will be consecutive.

In this arrangement the normal work day for all EMPLOYEES will be ten (10) consecutive hours of work, exclusive of one-half (1/2) hour non-paid lunch period.

On A and B team operation, the first eight (8) hours shall be paid at the straight time rate. The ninth (9) and tenth (10) hours shall be paid at one and one-half (1-1/2) times the straight time rate. After ten (10) hours the rate shall be two (2) times the straight time rate.

The work day for each EMPLOYEE shall be defined as the twenty-four (24) hour period which begins with the regular starting time of the EMPLOYEE'S shift and ends with the regular starting time of the EMPLOYEE'S shift the following day. In this shift arrangement the day shift shall be worked between the hours of 7:00 a.m. and 6:00 p.m., as described above.

Those general foremen and selected foremen who are directed to report to work the day before the first day of the four day work cycle to complete preparations for their team's scheduled work activities shall work eight (8) hours on that day and be paid at the rate of time and one-half (1-1/2) the basic straight time hourly wage rate.

If for any reason, journeymen are directed to report to work the day before the first day of the four day work cycle, they shall be paid at the rate of time and one-half (1-1/2) the basic straight time hourly wage rate.

Those directed to work the day after completion of their four-day shift shall be paid at the rate of two times the basic straight time hourly wage rate.

The first ten (10) hours of work performed on Sundays shall be paid at time and one-half (1-1/2) the basic straight time hourly wage rate. After ten (10) hours of work, the rate shall be two (2) times the basic straight time hourly wage rate.

Changing from one alternating shift to another will not be permitted without a minimum of two consecutive non-working days prior to transferring to the other alternating shift.

### 4. Lunch Period

The EMPLOYER shall schedule individual lunch period to commence within one-half hour before the mid-point or within one-half hour after the midpoint of the shift of not less than thirty (30) minutes but not to exceed one hour based on an eight (8) hour shift.

When at the EMPLOYERS direction, an EMPLOYEE works through the lunch period, that EMPLOYEE shall be paid at the overtime rate for such period, and allowed reasonable time for eating his lunch later, not to exceed thirty (30) minutes, without any loss of time resulting.

#### 5. Overtime

The first two (2) hours performed in excess of the eight (8) hour work day, Monday through Friday, and the first ten (10) hours on Saturday shall be paid at one and one-half (1-1/2) times the straight time rate. All work performed on Sundays and holidays and in excess of ten (10) hours a day shall be paid two (2) times the straight time hourly rate. This applies to the normal work day as set out in Sections 1 and 2 above.

There shall be no duplication or pyramiding of overtime.

#### 6. Holidays

Unpaid holidays recognized under this AGREEMENT shall be as follows:

New Year's Day  
Memorial Day  
Independence Day  
Labor Day  
Veteran's Day  
Thanksgiving Day  
The Friday After Thanksgiving and  
Christmas Day

Should any of these holidays fall on a Sunday, the following Monday shall be considered a legal holiday and observed as such. A holiday shall be the 24-hour period commencing with the start time of the first shift on the day of the holiday. No work shall be performed on Labor Day except to save life or property.

#### 7. Emergency

It will not be a violation of this AGREEMENT when the EMPLOYER or OWNER considers it necessary to shut down the project because of an emergency situation that could endanger life, safety, or property. In such cases, EMPLOYEES will be compensated only for actual time worked. In the case or situation of an emergency as defined herein whereby the EMPLOYER requests EMPLOYEES to remain at the job site, the EMPLOYEES will be compensated for such time at the applicable rate of pay as provided herein.

#### 8. Per Diem Pay

Under the terms of this AGREEMENT, no subsistence, pay for travel time, mileage, or zone rates will be paid to any EMPLOYEE. However, because the TERRITORY is located in a remote location and a considerable distance from populated areas, the EMPLOYER agrees to pay each EMPLOYEE sixteen dollars (\$16.00) per diem

payment for each day worked. The per diem payment shall be reviewed by the Executive Committee every two years on the anniversary date of this AGREEMENT.

The per diem payment will be paid in its entirety if the EMPLOYEE is sent home for reason other than termination for just cause. If the EMPLOYEE leaves the project voluntarily of his own accord, then the per diem shall be prorated on hours worked basis. No per diem payment will be paid if EMPLOYEE travels to and from the TERRITORY in EMPLOYER provided transportation during the designated shift hours.

The OWNER, because of various reasons, may elect to extend to the construction craftsmen transportation privileges provided by the OWNER s operating contractor. In the event the OWNER designates a project warrants furnished transportation there will be a five dollar (\$5.00) per diem payment made. However, because of time requirements and Health/Safety issues involved in using provided transportation, cafeteria privileges and washroom facilities will also be extended to those construction craftsmen.

#### 9. Reporting Pay

When an EMPLOYEE reports for work at the time and place specified by the EMPLOYER and he is not put to work or he works less than two hours, he shall be paid for two hours at the applicable straight time rate of pay. If after working two hours he is prevented from working a full eight hours he shall be paid for actual hours worked. It is the intent of this section that an EMPLOYEE who shows up for work shall be paid at least two hours of a shift, except when he had been notified, at the EMPLOYER'S expense, not to report either by direct contact by the EMPLOYER or, through a proper notice, at the time and place, determined by the Standing Board of Adjustment. When the proper notice is given and the EMPLOYEE reports, he shall not be entitled to reporting pay. Telephone contact or announcement per Appendix C shall be considered proper notice.

If an EMPLOYEE leaves the job on this own accord he will be paid for actual hours worked. If an EMPLOYEE reports to work in a condition unable to work he will not be eligible for reporting pay.

#### ARTICLE XVIII APPLICATION OF APPENDIX A (Footnote #24; #28)

Appendix A shall incorporate herein those wage rates, fringe benefits, working conditions (where not in conflict with this AGREEMENT, where expressly approved by the Executive Committee, and published as an attachment hereto), hiring procedure, (where not in conflict with this Agreement) Apprentice Ratios and Standards, tool lists and allowable salary deductions of the local area collective bargaining agreements specifically agreed to and contained therein. No other provisions in the local area collective bargaining agreement shall be considered part of this AGREEMENT or binding on the EMPLOYER or UNION within the TERRITORY unless incorporated herein.

The provisions of Appendix A shall be applicable for the duration of said wage rates and fringe benefits in the local area collective bargaining agreements and until the notice hereinafter specified. If during the life of this AGREEMENT changes in the local area collective bargaining agreements are established and agreed upon by the bona fide collective bargaining representative of EMPLOYERS party thereto and the UNION party thereto, to the extent that such provisions fall within the scope of provisions contained in Appendix A of this AGREEMENT,

Appendix A shall be automatically modified to incorporate such changes. The UNION involved shall within 30 days notify the COORDINATOR and signatory EMPLOYERS of such changes in writing with specific reference to applicable changes and by attaching a copy of the duly executed local area collective bargaining agreement and a list of EMPLOYERS parties thereto. Such changes shall be effective upon the effective date applicable to the said local area collective bargaining agreement subject to any necessary government approval and proof thereof. Appendix A shall then be modified to reflect such changes.

To the extent that provisions are contained in the main agreement herein rather than Appendix A, such provisions will not be altered by any changes in the local area collective bargaining agreement.

No provisions in the local area collective bargaining agreement shall be incorporated in Appendix A, pursuant to this Article which discriminates against this site or was negotiated by the parties thereto to have special application to this site.

Industry promotion funds, for the purpose of this AGREEMENT are not considered an EMPLOYEE fringe benefit.

#### ARTICLE XIX UNION REPRESENTATIVES

##### 1. Union Representative Visit

Authorized UNION representatives shall have access to jobsites within the TERRITORY during working hours where work covered hereby is being performed provided that such representatives do not unreasonably interfere with the work of the EMPLOYEES. Arrangements for such visitations shall be made through the EMPLOYER and will be performed as expeditiously as possible and will be in keeping with the OWNER'S uniform rules of safety and security.

##### 2. Stewards

Each UNION shall have the right to designate a working journeyman as a steward. The UNION shall notify the EMPLOYER in writing of the identity of their designated steward. In addition to his work as an employee, the steward shall have the right to receive, but not to solicit, complaints or grievances and to discuss and assist in the adjustment of the same with the employee's appropriate supervisor. The EMPLOYER will not discriminate against the steward in the proper performance of his union duties. The steward shall not leave his work area without first notifying his appropriate supervisor or foreman as to his intent, and the reason thereof, where he can be reached, and the estimated time that he will be gone. Stewards shall not have the right to determine when overtime shall be worked or who shall work overtime. The EMPLOYER shall have the right to implement a system of written accountability of time spent by all stewards in the performance of their duties whenever they deem such action necessary. The presence or absence of the steward shall not affect the work of the craft. The steward, in addition to his work as a journeyman, will be permitted to perform during the work hours such of his normal UNION duties as cannot be performed at other times. The UNION agrees that such duties shall be performed as expeditiously as possible and the EMPLOYER agrees to allow the steward a reasonable amount of time to perform such duties. The steward shall receive his regular craft rate of pay. The steward's duties shall not include any matters relating to any supervisory function over which the EMPLOYER retains sole control. If a steward violates any of the rules of this Article, or fails



to work or competently perform work assignments, the EMPLOYER shall have the right to take whatever action deemed appropriate, including termination.

The working steward designated for one EMPLOYER has no authority with regard to the work of another EMPLOYER. If he should become involved in the affairs or disputes of another EMPLOYER, he will be subject to discharge. The EMPLOYER agrees to notify the UNION two (2) working days, confirmed in writing stating the cause, prior to termination of the working steward except for a violation of work rules. The steward shall be the last EMPLOYEE laid off provided he is qualified to perform the remaining work of the EMPLOYER.

**ARTICLE XX**  
**GRIEVANCE PROCEDURE**  
(Footnote #24; #29)

**Section 1.** A grievance is defined as a dispute regarding the interpretation and application of the provisions of this INEL Site Stabilization Agreement filed by a UNION or EMPLOYER covered by this AGREEMENT.

**Section 2.** The COORDINATOR, UNIONS and EMPLOYERS shall attempt to achieve compliance with this AGREEMENT by both UNIONS and EMPLOYERS who are parties hereto.

**Section 3.** Grievances relating to the acts or failure to act of any particular party shall be filed against that party. There shall be no actual or threatened work stoppage, work interruption, slowdown, featherbedding, sitdown, strike, picketing, handbilling, or public notice of any kind during the entire term of the grievance proceedings.

**Section 4.** All grievances shall be handled in the following manner, except where an established C.I.R. is provided for in the local agreement in which case those provisions shall apply:

(a) **Step 1.** A grievance may be filed no later than five (5) working days after the act alleged to constitute a grievance occurred. The grievance must be presented by the UNION or EMPLOYER to the proper EMPLOYER or UNION representative involved as the case may be. If the grievance is not resolved within one (1) working day, the grievance shall be reduced to writing, citing the Article and paragraph of this AGREEMENT which has been allegedly violated. Such written notice shall identify and describe the grievance. It should contain the name of the Grievant, the UNION, and the EMPLOYER; a detailed description of the act, failure to act, or incident alleged to constitute the breach; and a statement of the relief or remedy sought. The Grievance Procedure Form, attached hereto, shall be used to initiate all grievances within the TERRITORY.

(b) **Step 2.** If the grievance is not settled at Step 1, the written grievance may, no later than five (5) working days after the time limitation set forth above for Step 1, be referred by the grievant UNION or EMPLOYER involved to the COORDINATOR, for discussion and resolution by the COORDINATOR, if possible.

(c) **Step 3.** If the grievance is not settled at Step 2, the grieving party shall request a Grievance Board of Adjustment review within five (5) working days by delivering written notice to Respondent Party, COORDINATOR, and UNIONS and/or International Unions. Within five (5) working days of such notice, a Grievance Board of Adjustment meeting shall be held and vote taken

with respect to the disposition of the grievance. The Grievance Board shall consist of a total of eleven (11) duly appointed representatives of the following: (1) Five representatives of a signatory local UNION (such representatives shall not be a party to the specific dispute); (2) five (5) EMPLOYER representatives signatory to this AGREEMENT appointed by the EMPLOYER (such EMPLOYERS shall not be a party to this dispute); and (3) the COORDINATOR. The COORDINATOR shall be a non-voting member. A quorum shall consist of three (3) or more UNION representatives and three (3) or more EMPLOYER representatives with equal votes. A majority vote will settle the grievance. If not settled in this step then it shall go to Step 4.

When a breach of Article VII is alleged, the Grievance Board of adjustment meeting shall be held within two (2) working days after notice is received. The sole issue at the hearing shall be whether or not violation of this Article has in fact occurred and the Grievance Board shall have no authority to consider any matter in justification, explanation or mitigation of such violations or to award damages, which issue is reserved for court proceedings, if any. The Award shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without an opinion. If any party desires an opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the Award. The Grievance Board of Adjustment may order cessation of the violation of this Article and other appropriate relief, and such Award shall be served on all parties by hand or registered mail upon issuance.

(d) Step 4. In the event the dispute is not resolved at Step 3 above, either party may serve upon the other and the COORDINATOR written notice by certified mail, within five (5) working days, requesting that the dispute be resolved by arbitration. If such a written notice is served, the parties shall jointly request the Federal Mediation and Conciliation Service to submit the names of five (5) qualified arbitrators, from which list the union and the employer shall alternately strike names until only one name is left, which person shall hear and resolve the dispute.

A hearing shall be conducted by the arbitrator, at which time the parties to the dispute shall be given the opportunity to appear and offer evidence in support of their positions. A decision by the arbitrator shall be rendered in writing within a reasonable time, not to exceed ten (10) days after the conclusion of the hearing. The decision by the arbitrator shall be final and binding upon the parties; provided, however, that the arbitrator shall not have the authority to alter or amend the provision of this AGREEMENT in any way. The reasonable expenses and fees of the arbitrator shall be borne equally by the parties.

Section 5. Decision at any step shall be submitted in writing and shall be final and binding on all parties.

Section 6. The parties to any stage of the grievance procedures, shall not have the authority to modify, amend, alter, add to or subtract from any provisions of this AGREEMENT. The Grievance Board of Adjustment and arbitrators shall be limited to the grievances as stated on the Grievance Procedure Form specified in Article XX, Section 4.

Section 7. A grievance shall be considered null and void if not filed and processed by the Grievant in accordance with the time limitations set forth above unless the parties involved agree in writing to extend said time limitations. The Grievance Board of Adjustment and/or arbitrator shall not have

the authority to excuse a failure by the Grievant to comply with the time limitations set forth above regardless of the reason given for such failure.

Section 8. Decisions at any step may be enforced by any Court of competent jurisdiction upon filing of this AGREEMENT and all other relevant documents referred herein above in the following manner. Telegraphic notice of the filing of such enforcement proceedings shall be given to the other party. In the proceeding to obtain a temporary order enforcing the Grievance Board of Adjustment or arbitrator's decision as issued, all parties waive the right to a hearing and agree that such proceeding may be ex parte.

Such agreement does not waive any party's right to participate in a hearing for a final order of enforcement. The Court's order or orders enforcing the Grievance Board of Adjustment or arbitrator's decision shall be served on all parties by hand or by delivery to their last known address or by registered mail.

Section 9. Any rights created by statute or law governing arbitration proceedings inconsistent with the procedure or which interfere with compliance therewith, are hereby waived by the parties to whom they accrue.

Note: Jurisdictional matters, including assignment and procedure, are not subject to the Grievance Procedure of the INEL Site Stabilization Agreement.

#### ARTICLE XXI SAFETY AND HEALTH

Safety standards of the OWNER and all safety policies of the EMPLOYERS must be observed by the EMPLOYEES and the EMPLOYERS on all work covered by this AGREEMENT.

Any EMPLOYEE'S failure to comply with the safety requirements heretofore referred to, or failure to participate and cooperate in such program, shall be cause for discharge.

The UNIONS agree that all EMPLOYEES will be required to use all required safety equipment and all required protective clothing. Failure or refusal to use such protective equipment is cause for discharge.

#### ARTICLE XXII STANDING BOARD OF ADJUSTMENT

The Parties to this AGREEMENT hereby recognize the necessity of cooperation and the elimination of disputes, misunderstandings or unfair practices on the part of any party and to secure this end it is hereby agreed that a Standing Board of Adjustment shall be established to be composed of the COORDINATOR and representatives of signatory EMPLOYERS at the SITE, and UNIONS party to this AGREEMENT who shall meet not less than once a month. The UNIONS and EMPLOYERS shall at such meetings present facts concerning any alleged violation of any part of this AGREEMENT. They shall also bring up any practice which in their opinion might lead to a misunderstanding or dispute between the Parties.

The Standing Board of Adjustment shall not be used for the purpose of arriving at any agreement to supersede, alter, modify, amend, add to or subtract from this AGREEMENT.

**ARTICLE XXIII**  
**EXECUTIVE COMMITTEE**  
(Footnote #8; #9)

The Executive Committee as provided for herein shall have the authority to change the Per Diem rate stated herein; draft a valid article, clause or provision as provided for in the Savings Clause (Article XXIV); and to make revisions necessary to this AGREEMENT. The Executive Committee shall consist of eleven (11) duly appointed representatives of the following: five (5) representatives of signatory UNIONS appointed by the UNIONS and five (5) representatives appointed by signatory EMPLOYERS and the non-voting COORDINATOR. Matters before this Committee shall be settled by a quorum of three (3) or more UNION representatives and three (3) or more EMPLOYER representatives, with equal votes. A majority vote will settle any matters before the Executive Committee.

In the event an issue, other than a proposed revision, is not resolved (i.e., tie vote) above, either party may serve upon the other and the COORDINATOR written notice by Certified Mail, within five (5) working days requesting that the dispute be resolved by arbitration. If such a written notice is served the parties shall jointly request the Federal Mediation and Conciliation Service to submit the names of five (5) qualified arbitrators, from which list the UNION and the EMPLOYER shall alternately strike names until only one name is left, which person shall hear and resolve the dispute.

A hearing shall be conducted by the Arbitrator at which time the parties to the dispute shall be given the opportunity to appear and offer evidence in support of their positions. A decision by the arbitrator shall be rendered in writing by a reasonable time, not to exceed ten (10) days after the conclusion of the hearing. The decision of the arbitrator shall be final and binding upon the parties.

The reasonable expenses and fees of the arbitrator shall be borne equally by the parties.

Members of the Executive Committee shall be appointed for a term of one (1) year.

**ARTICLE XXIV**  
**SAVINGS CLAUSE**

If any article, clause or provision of this AGREEMENT shall be declared invalid, inoperative or unenforceable by any recognized authority, the EMPLOYER and the UNIONS shall immediately suspend the operation of such article, clause or provision. The Executive Committee will then meet for the purpose of drafting a valid article, clause or provision to fulfill the intent of the parties and to replace the invalid article, clause or provision provided, however, that the remainder of this AGREEMENT shall continue in full force and effect.

**ARTICLE XXV**  
**DURATION**  
(Footnote #26)

This AGREEMENT shall be effective as of the 1st day of August, 1984, and shall remain in effect until the 31st day of July, 1989, and shall continue from year to year thereafter unless the EMPLOYERS or the UNIONS gives written notice to the other of a desire to terminate, amend or change this AGREEMENT. Such written notice must be given not less than sixty (60) days nor more than ninety (90) days prior to July 31st, 1989, or July 31st of any succeeding year.

This AGREEMENT shall remain in full force and effect for the duration of any job where construction commenced under the terms of this AGREEMENT regardless of the above termination dates.

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT this 19th day of June, 1984.

## INEL GRIEVANCE PROCEDURE FORM

AGGRIEVED PARTY: \_\_\_\_\_

RESPONDENT PARTY: \_\_\_\_\_

VIOLATION OF: \_\_\_\_\_ INEL SITE STABILIZATION AGREEMENT  
(CHECK 1) \_\_\_\_\_ INEL SITE CONSTRUCTION JURISDICTIONAL  
PROCEDURAL AGREEMENT

ARTICLE(S): \_\_\_\_\_ PARAGRAPH(S): \_\_\_\_\_

VIOLATION DISCOVERED: \_\_\_\_\_  
DATE TIME

DISCUSSION: \_\_\_\_\_  
DATE TIME

ITEMS DISCUSSED AND RESULTS:

REASON FOR GRIEVANCE:

ADJUSTMENT REQUESTED:

DATE SUBMITTED: \_\_\_\_\_ AGGRIEVED PARTY SIGNATURE: \_\_\_\_\_

DISTRIBUTION (2 COPIES EACH) TO: COORDINATOR AND RESPONDENT

INEL  
SITE CONSTRUCTION  
JURISDICTIONAL PROCEDURAL AGREEMENT

SITE CONSTRUCTION JURISDICTIONAL  
PROCEDURAL AGREEMENT

NOVEMBER 15, 1978

AMENDED JUNE 23, 1980  
AMENDED DECEMBER 17, 1981  
AMENDED NOVEMBER 4, 1982  
AMENDED AUGUST 4, 1983

DEPARTMENT OF ENERGY  
IDAHO FALLS, IDAHO

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Direct Any Inquiries Regarding This Agreement To:

James E. Reed  
INEL Site Labor Coordinator  
1424 E. 17<sup>th</sup> Street  
Idaho Falls, ID 83404  
Phone: (208) 524-4404



SITE CONSTRUCTION JURISDICTIONAL  
PROCEDURAL AGREEMENT  
FOR ALL CONSTRUCTION WORK  
at  
IDAHO NATIONAL ENGINEERING  
LABORATORY PROJECT  
of the  
DEPARTMENT OF ENERGY

THIS AGREEMENT, made and entered into this 15<sup>th</sup> day of November, 1978, by and between the Contractors and Subcontractors who shall become signatory to this AGREEMENT, hereinafter referred to as EMPLOYERS, performing construction work at the IDAHO NATIONAL ENGINEERING LABORATORY PROJECT of the IDAHO OFFICE of the DEPARTMENT OF ENERGY, hereinafter referred to as the SITE, and the Local Unions listed below, hereinafter collectively called UNIONS.

It is understood that the terms, conditions and procedures of this AGREEMENT shall be in force and applicable only during those periods of time that a Contractor or Subcontractor is performing work under a SITE contract or subcontract.

WITNESSETH WHEREAS the COORDINATOR is responsible for the administration and application of the Jurisdictional Procedural Agreement and for assisting with the Equal Employment Program at the SITE, for all construction employers, and attempt to mediate or otherwise provide pertinent information on all jurisdictional matters; and

WHEREAS, it is the desire of the parties hereto to provide, establish and put into practice effective methods for the settlement of jurisdictional misunderstandings or jurisdictional disputes which may arise under this agreement on the SITE without strike, lockout, work stoppage, or slowdown, to the end that all parties shall be assured of continuity of operation and continuity of employment and in order that harmonious relations will be maintained;

Since it is the desire of the parties to continue this Procedural Agreement through its effective period without disruption or delay, the following action shall be taken in the event the COORDINATOR is unable to carry out the assigned and agreed to duties as set forth in this Agreement, due to sickness, accident, death, or voluntary termination. Within forty-eight (48) hours of notification that the COORDINATOR cannot fulfill his assigned duties, any member of the Executive Committee of the Standing Board of Adjustment shall have the authority to call for a meeting of the Executive Committee. Notification shall be made in writing to all other members of the Executive Committee.

The Executive Committee shall meet and upon agreement that the COORDINATOR cannot fulfill his assigned duties, or is unacceptable to the Committee, the Committee will institute a search for an acceptable replacement for the COORDINATOR. Further, during the interim period while there is no COORDINATOR,

the Executive Committee shall assume all the Coordinator's duties and responsibilities pertaining to this Agreement.

In the event of involuntary termination of the COORDINATOR, any member of the Executive Committee may, at his discretion, request a meeting of the Executive Committee. In the event the Executive Committee can not, by simple majority, agree with the involuntary termination, this Agreement shall become null and void.

In the event of voluntary termination of the COORDINATOR, the Executive Committee shall elect a new qualified COORDINATOR. In the event the Executive Committee can not, by simple majority, agree with the selection, this Agreement shall become null and void.

NOW, THEREFORE, in consideration of the premises, it is agreed:

## ARTICLE I

### THE SITE

For the purposes of this AGREEMENT, the SITE shall mean and include any and all contracts and subcontracts for the performance of construction work at the Idaho National Engineering Laboratory of the Idaho Office of the Department of Energy in Bonneville, Butte, Bingham, Clark, Cassia, and Jefferson Counties, Idaho.

The SITE is recognized by the parties as a project of major national importance and urgent priority and for its prompt and efficient construction a large number of skilled craftsmen and workmen are required. It is also recognized that the extreme advances of design, materials, and construction methods which will be required to complete the structure will create new situations and jurisdictional problems for which there must be ready and sound methods of determination and settlement between the parties without any stoppage or delay in the work. It is the purpose to maintain competent and capable workmen for the performance of the work undertaken by the EMPLOYERS and to maintain a continuity of employment for the workmen so secured, to establish and maintain harmonious labor-management relations throughout the duration of construction and to avoid strikes, lockouts, or delays in the prosecution of the work.

## ARTICLE II

### SIGNATORY CONTRACTORS' REQUIREMENTS

Any EMPLOYER or his Subcontractor at any tier who is performing construction work for the Idaho Operations Office of the Department of Energy at the Idaho National Engineering Laboratory, shall become signatory to this AGREEMENT for all work covered in such contracts or subcontracts. Provision will be made for any such EMPLOYER or Subcontractor at any tier to sign and fully comply with this AGREEMENT for all work covered by its contract or subcontracts performed at the site of construction provided that this Jurisdictional Procedural Agreement shall apply to this SITE only.

Signatory contractors will bear the procedural responsibilities of this agreement of their subtier contractors who do not become signatory to this agreement.

If any EMPLOYER or his Subcontractor at any tier who is signatory to this AGREEMENT subcontracts the performance of any work, written provision shall be made within the subcontract for compliance by the Subcontractor with all of the terms and provisions of this AGREEMENT. In conformity with such obligation, any EMPLOYER or Subcontractor shall indicate his acceptance of the terms and conditions of this Agreement as governing work on this SITE by signing the Employers Signature Sheet provided for this purpose and delivering a copy thereof to the COORDINATOR prior to his commencement on any work at the SITE. Copies of signature sheets will be furnished upon request.

## ARTICLE III

### WORK ASSIGNMENTS AND JURISDICTION

Section 1. Assignment of work by the EMPLOYER shall be in accordance with the criteria and the Procedural Rules of the Impartial Board for the Settlement of Jurisdictional Disputes in the Building and Construction Industry<sup>1</sup>. Any jurisdictional disputes between unions where all unions with conflicting claims to the work are parties to the procedure established by the Impartial Board for the Settlement of Jurisdictional Disputes in the Construction industry, arising on the work, shall be resolved in the manner and by the procedures established by the Impartial Board for the Settlement of Jurisdictional Disputes in the Construction Industry, arising on the work, shall be resolved in the manner and by the procedures established by the Impartial Board for the Settlement of Jurisdictional Disputes in the building and Construction Industry, or any successor agency. For purposes of such a dispute, the EMPLOYER hereunder, for work at this site shall be party to, and bound by, the aforementioned Impartial Board.

Section 2. In the case of a jurisdictional dispute with the Teamsters Union, such dispute will be referred to the National Director of Construction of the Teamsters Union, the EMPLOYER, COORDINATOR, and the general President of the disputing union. In the event a final decision is not made by the parties in this section, the matter may upon request be referred to the grievance procedure referred to in Section 1., of this article.

Section 3. Where competing jurisdictional claims are made known to the COORDINATOR or EMPLOYER, the EMPLOYER with the COORDINATOR present will engage in preassignment and/or jurisdictional markup conference with representatives of the UNIONS involved to reach agreement on all such work assignments and/or make a clear assignment thereof by the EMPLOYER. Any disputes shall be resolved under Section 1 or 2 above.

Where there is a specific item of work as to which the EMPLOYER or COORDINATOR has been advised of competing jurisdictional claims, the UNIONS involved, the EMPLOYER and the COORDINATOR will be notified a minimum of twenty-four (24) hours prior to the proposed assignment of the work in dispute. The EMPLOYER has the obligation of presenting to the UNIONS and COORDINATOR all the pertinent data, drawings, specifications, or descriptions that are available at the time of such notice. If the parties are unable to reach agreement, the EMPLOYER shall make a clear assignment. Any disputes shall be resolved under Section 1 or 2 above.

Section 4. All jurisdictional disputes shall be handled exclusively in the manner specified in this Article and may not be referred to the Grievance and Arbitration Procedure provided in the respective local agreements. Either party may refer to the Grievance Procedure of this AGREEMENT any grievance which alleges that the other party is not complying with a valid decision issued in accordance with Section 1 or 2 of this Article.

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<sup>1</sup> Appendix A

Section 5. There shall be no work stoppage, lockouts, slowdowns, picketing, strikes or any other form of economic action arising out of or during the processing of any jurisdictional dispute.

Section 6. The UNION, EMPLOYER, or COORDINATOR may refer to the Grievance Procedure of this AGREEMENT any grievance which alleges that any party to this AGREEMENT is not complying with the provisions set forth in ARTICLE III, Sections 1 through 5.

#### ARTICLE IV

##### PRE-JOB CONFERENCE

One of the purposes of a Pre-Job Conference will be to establish the scope of the work in the individual Employer's contract. Where the size and scope of a contract or subcontract on this SITE that has been let to an Employer covered hereby warrants, a Pre-Job Conference shall be required upon request of the UNION, EMPLOYER, or COORDINATOR. The Conference will include presentation of information, if possible regarding the EMPLOYER's approximate dollar amount of the job estimate, duration of the job, estimated peak employment and any other conditions deemed peculiar to the particular contract or subcontract, including a general description of the nature of the work to be performed and drawings and specifications, if available.

#### ARTICLE V

##### GRIEVANCE PROCEDURE

Section 1. A grievance is defined as a dispute regarding the interpretation of jurisdiction and application of the provisions of this SITE Jurisdictional Procedural Agreement filed by a UNION or EMPLOYER covered by this AGREEMENT. Disputes specifically related to the application and interpretation of the respective local or International Union Agreements shall be processed under the respective Agreement. All jurisdictional disputes between competing crafts employed on this SITE shall be processed in accordance with Sections 1, 2, and 3 of Article III.

Section 2. The COORDINATOR and the Idaho Building and Construction Trades Council (hereinafter referred to as COUNCIL) shall attempt to achieve compliance with this AGREEMENT by both UNIONS and EMPLOYERS who are parties hereto. In this regard, the COORDINATOR and the COUNCIL will take steps to assure the effective functioning of the grievance procedure.

Section 3. Grievances relating to the acts or failure to act of any particular Party shall be filed against that Party. There shall be no actual or threatened work stoppage, work interruption, slowdown, featherbedding, sitdown, strike, picketing, handbilling, or public notices of any kind during the entire term of the grievance proceedings.

Section 4. Any EMPLOYER or UNION whose act or failure to act gave rise to any monetary damage or penalty shall be solely responsible therefor, and not the COORDINATOR, COUNCIL, or OWNER.

Section 5. Other UNIONS or EMPLOYERS may also be joined as parties to any grievances when that UNION or EMPLOYER is directly affected by the outcome of the grievance, or participated in the events giving rise to the grievance, and shall be bound by any decision.

Section 6. All grievances shall be handles in the following manner:

- (a) Step 1. A grievance may be filed no later than five (5) working days after the act alleged to constitute a grievance is first discovered. The grievance must be presented by the UNION or EMPLOYER to the proper Employer or Union representative involved, as the case may be. If the grievance is not resolved within five (5) working days, the grievance shall be reduced to writing, citing the Article and paragraph of this AGREEMENT which has been allegedly violated. Such written notice shall identify and describe the grievance. It shall contain the name of the Grievant (the UNION or the Employer); a description of the act, failure to act, or incident alleged to constitute the breach; and a statement of the relief or remedy sought. The Grievance Procedure Form, attached hereto, shall be used to initiate all jurisdictional grievances on this SITE.
- (b) Step 2. If the grievance is not settled at Step 1, the written grievance may, no later than five (5) working days after the time limitation set forth above for Step 1, be referred by the grievant UNION or EMPLOYER involved to the COORDINATOR, for discussion and resolution by the COORDINATOR, if possible. This shall be referred to as Step 2 of the Grievance Procedure.
- (c) Step 3. If the grievance is not settled at Step 2, the grieving party shall request a Grievance Board of Adjustment review within five (5) working days by delivering a written notice to the Respondent Party, COORDINATOR, and COUNCIL and/or International Union, if the Local Union involved is not a member of said COUNCIL. Within five (5) working days of such notice, a Grievance Board of Adjustment meeting shall be held and a vote taken with respect to the disposition of the grievance. The Grievance Board shall consist of a total of five (5) duly appointed representatives of the following: (1) One representative of a signatory local UNION appointed by the COUNCIL (such representative shall not be a party to the specific dispute); (2) One COUNCIL representative; (3) Two EMPLOYER representatives signatory to this AGREEMENT appointed by the COORDINATOR (such EMPLOYERS shall not be a party to this dispute); and (4) the COORDINATOR. The grievance may be settled by three (3) votes favoring the determined outcome. Otherwise, the grievance shall be deemed not settled.
- (d) Step 4. When a flagrant violation is alleged to have taken place or has been threatened (such as work stoppage or lockout), an accelerated grievance may be

requested by the UNION, EMPLOYER or COORDINATOR. A written notice must be given to the COORDINATOR and the COUNCIL with copies to the local UNION or EMPLOYER involved. Upon such notice, and within two (2) working days, a Grievance Board shall be chosen as provided in Step 3 above. The Grievance Board chosen must be available to hear the dispute within two (2) working days after the written notice has been received by the COORDINATOR and the COUNCIL. Unless time is waived in writing by all parties to the dispute, the grievance proceedings shall commence within the two (2) working day period described above and a decision rendered by the Grievance Board within one (1) working day after completion of the grievance hearing proceedings. Under the above circumstances, no voting member of the Grievance Board shall abstain from voting.

- (e) Step 5. In the event the Impartial Board for the Settlement of Jurisdictional Disputes in the Building and Construction Industry is for any reason inoperative or not deciding jurisdictional disputes, this Agreement hereby assumes that responsibility and will make jurisdictional awards based on Board rules and using the method embodied in this section of the INEL Site Construction Jurisdictional Procedural Agreement.

(i) In the event a contractor makes an assignment to a craft which one or more other crafts disagree with, the challenging union or unions will have two (2) days after the assignment is first discovered to meet with all parties, including the challenged contractor and union, to attempt to resolve the issue.

(ii) In the event the problem cannot be resolved as outlined above in paragraph (i), the contesting union or unions will have ten (10) calendar days to contact and meet with the interested International Representatives and contractors in an effort to resolve the dispute.

(iii) In the event the dispute is not resolved in accordance with Paragraphs (i) or (ii) above, there shall be established a list (which shall be odd in number when practical) of local persons qualified to serve as neutral parties to hear and resolve the dispute. The list of arbitrators will be the responsibility of the Executive Committee of the Standing Board of Adjustment to establish and maintain.

(iv) The Arbitrator shall be chosen from the list described above in Paragraph (iii). The parties shall agree on an arbitrator by alternately striking names (the moving party striking first) until only one (1) name remains. The parties must select an arbitrator within five (5) working days after the panel has been submitted to them. If the parties are unable or unwilling to select an arbitrator, then the Executive Committee will make the selection.

(v) The Arbitrator must be willing to: (1) hear the case within 24 hours of notification of a hearing; (2) make a decision within 24 hours after the hearing;

and (3) accept a fee of not more than \$100 for each case. The fee will be paid in the following manner: Any local Union who processes a claim of misassignment and is not successful through arbitration will pay the cost of the arbitration. If said Local is successful and the work is awarded to said Local by the Arbitrator, then the cost of arbitration will be borne jointly by the local to whom the work was originally assigned and the contractor who made the assignment.

(vi) The decision of the Arbitrator shall be final and binding on all parties to this Agreement. The parties to any stage of the grievance procedures, or the Arbitrator, shall not have the authority to modify, amend, alter, add to or subtract from any provision of this Agreement. The Arbitrator shall be limited to the grievance as stated on the Grievance Procedure Form specified in Article V, Section 6. The Arbitrator shall not have the authority to make a retroactive decision or assess penalties.

(e) Step 6. The EMPLOYER, UNIONS, and COORDINATOR, as parties signatory to this AGREEMENT, agree to utilize the Grievance Procedure set forth in this AGREEMENT for all disputes regarding the interpretation, application, and alleged violations of this Procedural Agreement before taking any legal action to remedy violations covered by this AGREEMENT.

The cost of collection of awards made by the Grievance Board of Adjustment shall be allowable and borne by the party assigned to pay the award. These costs shall include all court costs and reasonable attorney's fees.

Section 7. Decisions of the Grievance Board of Adjustment shall be submitted in writing and shall be final and binding on all Parties.

Section 8. The Parties to any stage of the grievance procedures, or the Grievance Board of Adjustment shall not have the authority to modify, amend, alter, add to or subtract from any provision of this AGREEMENT. The Grievance Board of Adjustment shall be limited to the grievance as stated on the Grievance Procedure Form specified in Article V, Section 6.

Section 9. A grievance shall be considered null and void if not filed and processed by the Grievant in accordance with the time limitations set forth above unless the Parties involved agree in writing to extend said time limitations. The Grievance Board of Adjustment shall not have the authority to excuse a failure by the Grievant to comply with the time limitations set forth above regardless of the reason given for such failure.



## ARTICLE VI

### STANDING BOARD OF ADJUSTMENT

The Parties to this Agreement hereby recognize the necessity of cooperation and the elimination of disputes, misunderstandings or unfair practices on the part of any party and to secure this end it is hereby agreed that a Standing Board of Adjustment shall be established to be composed of the COORDINATOR and representatives of signatory EMPLOYERS at the SITE, and UNIONS party to this AGREEMENT who shall meet not less than once a month. The UNIONS and EMPLOYERS shall at such meetings present facts concerning any alleged violation of any part of the agreement. They shall also bring up any practice which in their opinion might lead to a misunderstanding or dispute between the Parties.

The Standing Board of Adjustment shall not be used for the purpose of arriving at any agreement to supercede, alter, modify, amend, add to or subtract from this AGREEMENT.

### EXECUTIVE COMMITTEE

The Parties to this AGREEMENT hereby establish an Executive Committee of the Standing Board of Adjustment consisting of the COORDINATOR, who shall be the non-voting Chairman; five (5) signatory voting EMPLOYER representatives selected by the signatory EMPLOYERS and five (5) voting UNION representatives selected by the UNIONS signatory to this AGREEMENT. A quorum will consist of four (4) members of the UNIONS and four (4) members of the EMPLOYERS, each party having equal votes. Meetings of the Executive Committee shall be called by the Chairman of the Committee from time to time as deemed necessary.

The Executive Committee, along with its duties to interpret, supersede, alter, modify, amend, add to or subtract from this Agreement, shall also be charged with the responsibility of taking actions necessary to monitor the COORDINATOR's actions, select or reject COORDINATOR candidates and act to establish an interim COORDINATOR in the event that the COORDINATOR is unable or refuses to act in his assigned duties. A majority vote of the Committee would constitute the decision of the Committee in these actions.

## ARTICLE VII

### TERM OF AGREEMENT

This AGREEMENT shall be effective as of the 15<sup>th</sup> day of November, 1978, and shall remain in effect until the 15<sup>th</sup> day of May, 1980, and shall continue from year to year thereafter unless the CONTRACTORS or the UNIONS give written notice

to the other of a desire to change, amend, modify or terminate this AGREEMENT. Such written notice must be given not less than sixty (60) days nor more than ninety (90) days prior to May 15, 1980, or January 1 of any succeeding year.

IN WITNESS WHEREOF, the Parties hereto have executed this AGREEMENT this 15<sup>th</sup> day of November, 1978.

## GRIEVANCE PROCEDURE FORM

A grievance is an alleged violation of the AGREEMENT. State specifically the Article(s) and/or Paragraph(s) involved. Then state why a violation is claimed and the remedy request. Fully identify all individuals involved.

AGGRIEVED PARTY: \_\_\_\_\_

RESPONDENT PARTY: \_\_\_\_\_

VIOLATION OF ARTICLES(s): \_\_\_\_\_ PARAGRAPH(s) \_\_\_\_\_

ORAL DISCUSSTION WITH SUPERVISOR: Date: \_\_\_\_\_ Time: \_\_\_\_\_

RESULT OF DISCUSSION:

DETAILED REASON(s) FOR GRIEVANCE:

SPECIFIC ADJUSTMENT REQUESTED:

\_\_\_\_\_  
(Date Submitted)

\_\_\_\_\_  
(Aggrieved Signature)

Distribution:  
2 copies to Respondent  
2 copies to Coordinator

## APPENDIX "A"

### CONTRACTOR'S RESPONSIBILITY

1. The contractor who has the responsibility for the performance and installation shall make a specific assignment of the work which is included in his contract. For instance, if contractor A subcontracts certain work to contractor B, then contractor B shall have the responsibility for making the specific assignment for the work included in his contract. If contractor B in turn shall subcontract certain work to contractor C, then contractor C shall have the responsibility for making the specific assignment for the work included in his contract. It is a violation of the plan for the contractor to hold up disputed work or shut down a project on account of a jurisdictional dispute.

The Board will not render advisory opinions or decisions regarding initial assignment of work. The initial assignment must be made by the contractor or subcontractor responsible for its performance.

2. The assignment to be made by the contractor shall be according to the following bases:

(a) Where a decision of record applies to the disputed work, or where an agreement of record between the disputing trades applies to the disputed work, the contractor shall assign the work in accordance with such agreement or decision of record. Agreements and decisions of record are compiled and published by the Building and Construction Trades Department, AFL-CIO, ("Agreements and Decisions Rendered Affecting the Building Industry"). Where a national agreement between disputing trades applies that has been filed with the Board and attested by the Chairman, even though not an agreement of record, the contractor shall assign the work in accordance with such agreement. In negotiating such national agreements between International Unions, prior consultation with the appropriate management groups on the making of agreements between International Unions is desirable and should be carried on.

Decisions of record are applicable to all trades. Agreements of record are applicable only to the parties signatory to such agreements.

(b) Where no decision or agreement under (a) applies, the contractor shall assign the disputed work in accordance with established trade practice or the prevailing practice in the locality. The locality for the purpose of determining the prevailing practice shall be defined ordinarily to mean the geographical jurisdiction of the local Building and Construction Trades Council in which the project is located.

(c) If a dispute has arisen prior to the specific assignment of work where no decision or agreement under (a) applies, or where there is no predominant practice in the locality, the contractor shall nonetheless make a specific assignment according to his best judgment after consulting the representatives of the contesting trades and considering any arguments or facts the trades may wish to present regarding the applicable decisions or agreements of record or practice in the locality. The contractor should also consult any local association of contractors in the locality regarding the established practice.

3. When a contractor has made an assignment of work, he shall continue the assignment without alteration unless otherwise directed by the Board or by agreement between the International Unions involved.

(a) Unloading and/or handling of materials to stockpile or storage by a trade for the convenience of the responsible contractor when his employees are not on the job site, or in an emergency situation, shall not be considered to be an original assignment to that trade.

(b) Starting of work by a trade without a specific assignment by an authorized representative of the responsible contractor shall not be considered an original assignment to that trade, provided that the responsible contractor, or his authorized representative, promptly, and in any event within eight working hours following the start of work, takes positive steps to stop further unauthorized performance of the work by that trade.

(c) The Chairman of the Board shall determine all questions of original assignment of work and render decisions regarding same. An appeal from the Chairman's decision may be made to a meeting of the full Board.

4. In the event that there is any stoppage of work, or threat of a stoppage, or cessation of operations, arising out of a jurisdictional dispute following an assignment of work, the contractor is to notify immediately the Chairman, Impartial Jurisdictional Disputes Board, 815 16<sup>th</sup> Street, NW, Washington, DC, 20006.

Any International Union may also notify the Board of a work stoppage engaged in by another union.

Such notice of work stoppage shall include:

The contractors involved;

Their mailing addresses;

The name of the project;

The location of the project;

The disputing trades;

A full and detailed description of the work in dispute;

The assignment of work that has been made, and

The contractor making the assignment.

#### UNION'S RESPONSIBILITY

1. The agreement provides (Article VII, Section 1) that "during the existence of this agreement there shall be no strikes or work stoppages arising out of any jurisdictional dispute."

2. When a contractor has made a specific work assignment, all unions shall remain at work and process any complaint over a jurisdictional dispute in accordance with the procedures herein established by the Board. Any union which protests that a contractor has failed to assign work in accordance with the procedures specified above, shall remain at work and process the complaint through its international office. The Board is prohibited from taking action on protests or requests from Local Unions or Building and Construction Trades Councils.

3. An International Union may file with the Board a protest against the work assignment of a contractor on a particular project. Such protest of assignment shall indicate the project, the name and address of contractors, location of the project, the disputing trades, an account of events leading to the work assignment, and a full and detailed description of the work in dispute. The International Union shall also indicate the basis of its protest of the assignment by the contractor. The International Union shall cite any decision or agreement of record on which its protest is based. When no decisions or agreements of record are applicable, the International Union shall cite the basis for its protest of assignment. The

International Union, before filing a request for a job decision, shall advise its local union to notify the contractors of its claim for the disputed work and to seek to settle such dispute prior to filing the case with the Board.

When the International Union filing a request for a job decision is directed to comply with the requirement of notification to the employer of a jurisdictional dispute, a compliance notice shall be forwarded to the Chairman of the Board, who shall forward a copy of such notice to the other union or unions involved in the dispute prior to consideration and decision of the Board.

4. When an International Union has been directed by the Board to direct the return of men to work, or to furnish men to a project, in a jurisdictional dispute, the General President of the International Union shall promptly comply with the order of the Board. He shall use all the authority of the International Union to secure prompt compliance with an order of the Board.

In line with the intent of the above paragraph, picket lines of a jurisdictional nature must be handles immediately by the Chairman of the Board. The Chairman, when a jurisdictional picket line is brought to his attention, will immediately send a communication to the Building and Construction trades Department and to the International whose local has put up the picket line.

#### APPENDIX 'B'

It is understood that situations may arise which will require closing down some or all operations at the INEL by DOE. An agreement is hereby set forth concerning the obligations of construction contractors and construction crafts under these conditions.

The contractors and subcontractors will:

1. Make every attempt to notify craftsmen as early as possible of the occurrence of such situations and if the craftsmen will be required to report to work and where they are to report.
2. If notification can't be made prior to the end of shift for the next day, notification will be made by DOE two hours prior to the shift to be cancelled on the following radio stations:

Idaho Falls	-	KID, KUPI
Pocatello	-	KSEI
3. Set up a reporting station, normally in the CFA cafeteria, which will be manned to sign in any employees who report to work where proper notification has not been given.
4. Inform each employee as to whether he or she is to go home or remain at work.
5. Pay employees according to their crafts labor agreement.
6. In the event emergency closing occurs on a designated payday, the EMPLOYER will deliver paychecks to the appropriate union hall for distribution, or by mail, provided the EMPLOYER has access to payroll records.
7. Be responsible for notifying their employees of this procedure.
8. Notify employees when to return to work.

The craft employee will:

1. Be responsible to monitor one of the radio stations listed above in his or her area on a routine basis.
2. Not report to work if instructed in the radio announcement.
3. In the event he or she reports to work and is unable to reach his or her work location, report to the CFA cafeteria to the reporting station of his or her employer for sign in and instruction.

## **APPENDIX A**

### **WORKING CONDITIONS FOR ALL CRAFTS**

(Footnotes #2; #3; #5; #6; #10 #15; #28; #33)

1. Where private cars must be parked in a designated parking area or are prohibited from entering the work area of a project, a man haul shall be discussed, and where deemed necessary, provided.
2. Special clothing or equipment, when deemed necessary, shall be furnished by the Contractor to an employee, including but not limited to the following: approved safety hats, rubber pants or equal, rubber boots, rain coats, life jackets, rubber gloves and foul weather hard hat liners. The employee may be charged for special clothing or equipment issued to him that is not returned to the Contractor. The employee shall not be charged for normal wear and tear nor for loss which occurs on the job and is beyond his control. The Employer shall make available cool, potable drinking water all times. (6)
3. Employees shall not be required, nor permitted, to furnish their own vehicle for job purposes.
4. When an employee receives orders from more than one designated foreman, he shall follow the last order received. He shall not be discriminated against in any way for doing so.
5. When an employee is assigned to work at more than one classification during one-half of a shift, he shall be paid at the wage rate for the highest classification worked during the one-half shift. No employee shall be required to work at a lower rate of pay than the one at which he was dispatched unless the employee has been notified, and the employee shall have the choice to accept the lower rate or be terminated with a reduction in force.
6. An employee suffering an industrial injury who is advised not to resume work by his foreman or first-aid attendant, or by a physician to whom he has been referred, shall be paid on his usual basis for the entire shift on which the injury occurred.
7. The Contractor will replace employees' tools and clothing if damaged or lost by fire, flood, or forced entry while on the Contractor's project or premises, or while being conveyed in the Contractor's vehicle. Where necessary, the Employer shall provide a safe and secure place on the job for the storage of tools and clothing, both during and after working hours.
8. Fringe benefit, trust funds, bonds, qualifications and penalties provisions within the local area collective bargaining agreements shall apply.
9. Wages shall be payable on the job during working hours on day designated. All wages due shall be paid in lawful currency or by negotiable check payable on demand at par. In the event of a termination other than a quit, the employee will be paid at the time of termination. Each employee shall be given a separate check stub or prepared slip, showing the information required by law. Any additional time spent in waiting for paychecks shall be paid at the applicable rate. (5)



10. Employees dispatched with special skills or qualifications, as provided for within the agreement, shall regularly utilize those skills or qualifications.
11. Craft work which has customarily and historically been performed at the jobsite or in the shop of the employer by employees covered by the local area collective bargaining agreement, shall continue to be performed at the jobsite or in the shop of the employer by such employees.
12. Any employee who is sent to work by the employer to an area outside the territory of this agreement shall receive a basic day's pay for eight (8) hours for each day spent in traveling, plus his actual transportation, lodging and meals. All traveling done on Saturdays, Sundays, or holidays shall be paid at the basic rate.
13. On all energized circuits or equipment carrying 440 volts or over, as a safety measure, two (2) or more journeymen must work together.
14. On overtime, if employees are directed to work beyond the tenth (10th) hour, at the end of the tenth (10th) hour the employee shall be paid one-half hour to eat a meal, and the same provision shall apply each four (4) hours thereafter. No employee shall be required to work in excess of four (4) hours without a break.
15. As it pertains to shift changes for individual employees, there shall be no more than two shift changes in a seven-calendar-day period.
16. In the event that the designated pay day occurs during an EMPLOYEE'S scheduled non-working days, (i.e., 4-10's), the EMPLOYEE may pick up his pay at the EMPLOYER'S (southeast Idaho) business office during normal offices hours on the designated pay day or consecutive scheduled non-working days until the EMPLOYEE'S next scheduled working day, at which time the pay will be payable at the jobsite during working hours. If the EMPLOYEE fails to pick up pay, at the end of the next payday pay will be sent by certified mail to the last designated address. (15) It is not the intent that the EMPLOYER be required to establish more than one pay day per week. (8/28/85)
17. Training and medical examinations related to construction work are covered by the INEL Site Stabilization Agreement, including per diem. (1/3/91; 2/13/91/ 6/23/93)

#### **WORKING CONDITIONS - OPERATING ENGINEERS ONLY**

1. Crews on power shovels, draglines, clamshells, whirleys, hammer heads, stifflegs, derricks, backhoes with 360 degree swing, gradalls, cranes and truck cranes shall consist of an operator and oiler or fireman (assistant to operator).

On cranes (25 tons and under) and Oiler shall be optional. If a second man is needed, he shall be an Operating Engineer.

On backhoes and shovels, the Oiler shall be required to be qualified to perform grade checking duties in addition to his duties as an oiler.

By mutual agreement between the Contractor and the Union, one Oiler may be used to service two cranes that are operating in close proximity to one another. In such cases, the Oiler shall receive the Service Oiler rate of pay.

In special circumstances and other special conditions, size of crane crews may be adjusted providing the parties mutually determine, by conference, the requirements necessary to meet the conditions that prevail. When, in the opinion of the parties, any machine under the jurisdiction of this Union requires an assistant to the Operator, he shall be a man covered by this Agreement and shall be under the supervision of the Operator at all times.

2. All Operators and Oilers on rental equipment, within the jurisdiction of this agreement, shall be permitted to move from job to job as directed by the renter.
3. A compressor operator shall be assigned to attend the compressors on a project where the capacity of the compressors exceeds 1500 cubic feet per minute.
4. Side curtains and fans shall be furnished to protect employees during appropriate periods of weather. Side curtains damaged willfully or by negligence shall be subject to replacement by employees concerned - fair wear and tear expected. Adequate windshield, fenders and/or splash boards will be provided on rubber tired scrapers. A cab and heater will be required on motor patrols.

Rubber tired tractors, scrapers and front-end loaders, when ordered factory new by a contractor after this agreement is signed by the contractor, shall be equipped with cabs and heaters.

5. In the event the crane operator on any project believes that signals given to him by a signalman are dangerously beyond the capacity of the machine or are likely to endanger the lives of other workmen, he may refuse to obey such signals provided he immediately contacts his supervisor and explains the circumstances.
6. This section shall not prevent employees of equipment dealers from performing normal service or repairs to equipment under the terms of a factory warranty. However, such equipment dealers' employees shall be limited to service and repair provided under the standard warranty of the manufacturer or dealer. Where regular mechanics are employed on the job, and warranty mechanics perform warranty work, such work shall be performed on a ratio of one-to-one.

#### **WORKING CONDITIONS - TEAMSTERS ONLY**

1. Whenever a driver is fined, through no fault of his own, because of overload, including maximum weights or load distribution, or faulty equipment, the Employer shall pay all fines assessed against the Employee. If the Employee loses time, he shall be paid for the hours lost at the straight time hourly wage rate.
2. Actual reasonable road expense (meals and lodging receipts required) for Low Boy transport and other drivers will be reimbursed by the Contractor for time spent overnight away from established job site or Contractor headquarters.
3. It is the intent of this Agreement that warehousemen will not drive; drivers will not warehouse. It is also understood that certain situations will merit an overlap of these classifications to avoid gross featherbedding. Any overlap will only be allowed when there is a mutual consent between the Union and the Contractor.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>ASBESTOS WORKERS</u></b> (Effective 10/1/98 - 5/31/99)						
Journeyman	\$ <u>22.63</u>	\$ <u>-0-</u>	\$ <u>3.28 (a)</u>	\$ <u>2.82</u>	\$ <u>0.10</u>	

Foreman and  
General Foreman

Wage rates are negotiated between the Contractor and the Foreman - usually  
\$1.50 to \$2.00 over the mechanics wage rate - 5% minimum.

(a) Defined Pension Fund: \$ 1.66

Individual Pension Fund:

Class II	\$ <u>1.55</u>
Class III	\$ <u>2.05 *</u>
Class IV	\$ <u>2.55 *</u>
Class V	\$ <u>3.80 *</u>

\* If an Employee is listed in Class III through V, then the difference in the Individual is deducted from the Employee's base rate.

Occupational Health: \$ 0.07

**DEDUCTIONS**

(b) Dues Checkoff (per hour):	\$ <u>3%</u>
(c) Political Action Checkoff:	\$ <u>0.01</u>
(d) Working Assessment:	\$ <u>0.25</u> per man per working hour.
(e) International Assessment	\$ <u>0.35</u> per man per working hour.

**REQUIRED TOOL LIST:**

Basic Tools: Tape measure; knife; bull nips; scl/2

Secondary Tools - Insulation Workers employed in the trade longer than three (3) months:

Pointing trowel; tin snips, aviation snips - left, right and straight; keyhole or compass saw; rubber bands or springs; chalk box with chalk; mallet or beater; paste brush; tool kit or bag pouch; dividers; punch or awl; screwdrivers; paltry lacing needle (hook); mitre chart; flat trowel; hand saw; large rubber gloves.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>BOILERMAKERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>21.09</u>	\$ <u>1.30</u> (c)	\$ <u>4.25</u> (a)	\$ <u>3.45</u>	\$ <u>0.56</u> (b)	
Ass't Foreman	\$ <u>22.09</u>	\$ <u>1.30</u> (c)	\$ <u>4.25</u> (a)	\$ <u>3.45</u>	\$ <u>0.56</u> (b)	
Foreman	\$ <u>23.09</u>	\$ <u>1.30</u> (c)	\$ <u>4.25</u> (a)	\$ <u>3.45</u>	\$ <u>0.56</u> (b)	
General Foreman	Rate to be negotiated					

(a) Pension Fund: \$ 3.25  
and  
 National Annuity Fund: \$ 1.00 straight time;  
 \$ 1.50 time and one-half;  
 \$ 2.00 double time.

(b) Apprenticeship Fund: \$ 0.20  
 MOST Training Fund: \$ 0.21  
 Education & Training Fund: \$ 0.15

(c) Vacation trust payments are to be at straight time hours worked and at the applicable overtime rate for hours worked beyond straight time hours.

**DEDUCTIONS:**

(d) Field Dues Assessment: \$ 3.5%  
 (calculated on all taxable gross wages,  
 i.e., actual wage plus vacation pay)

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>BRICKLAYERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>18.42</u> (b)	\$ <u>-0-</u>	\$ <u>2.80</u> (a)	\$ <u>2.65</u>	\$ <u>0.25</u>	
Foreman	\$1.00 per hour over Journeyman rate.					

(a) N.W. Pension : \$ 2.60

Bricklayers Int'l Pension Fund: \$ 0.50

(b) Over 4 continuous hours on a saw will be \$.25 extra per hour.

**DEDUCTIONS**

(c) Working Dues Assessment: \$ 2.5%

**REQUIRED TOOL LISTS**

Levels; trowels, jointers; brushes.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>CREDIT UNION PROVISION</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPRENTICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>CARPENTERS</u></b> (Effective 6/1/98 - 5/31/99)						
Group I	\$ <u>19.87</u> (a)	\$ <u>1.00</u>	\$ <u>1.93</u>	\$ <u>2.70</u>	\$ <u>0.25</u>	(b)
Group II	\$ <u>20.04</u> (a)	\$ <u>1.00</u>	\$ <u>1.93</u>	\$ <u>2.70</u>	\$ <u>0.25</u>	(b)
Group III	\$ <u>20.18</u> (a)	\$ <u>1.00</u>	\$ <u>1.93</u>	\$ <u>2.70</u>	\$ <u>0.25</u>	(b)
Foreman	\$1.00 per hour over the Journeyman scale of the classification under his supervision					
General Foreman	Salary negotiated between man and contractor					

(a) \$1.00 for CERTIFIED HAZARDOUS WASTE WORKER wearing a FULLY ENCAPSULATED SUIT OR CHEMICAL SPLASH SUIT when requiring SUPPLIED AIR.

(b) Benefits apply to Journeymen and Apprentices

**GROUP DEFINITIONS**

<u>GROUP</u>	<u>DEFINITION</u>
1	Carpenter, Floor Layer, Shingler, Drywall Applicator and Installer of metal studs, metal framing, acoustical materia partitions, porcelain and enamel and metal panels, Marlite and rigid or flexible plastic laminates, weatherstripping and ins lather, <b>HAZARDOUS WASTE WORKER.</b>
2	Saw filer, Stationary Machine Operator, Piledriverman, Bridgeman, Wharf Builder, Automatic PileThreader, <b>HAZAI WASTE WORKER.</b>
3	Millwright and Machine Erector, Piledriverman's Boom Man, <b>HAZARDOUS WASTE WORKER.</b>
4	Diver, <b>HAZARDOUS WASTE WORKER.</b>

**REQUIRED TOOL LIST:**

1 Claw Hammer, 16 oz.; 1 16' tape; 1 8-point handsaw; 1 combination square; 2 nail sets; 1 chalk box, 100'; 1 plumb bob; 1 24' or 28' level; 1 framing square R100B or equal; 1 18" pry bar; 1 12" wrench adjustable; 1 7" vise grip; 1 tool box with lock; and 1 pair carpenter overalls or belt.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>CEMENT MASONS</u></b> (Effective 6/1/98 - 5/31/99)						
Group I	\$ <u>16.80</u> (a)	\$ <u>2.50</u>	\$ <u>2.85</u>	\$ <u>2.80</u>	\$ <u>0.30</u>	
Group II	\$ <u>17.02</u> (a)	\$ <u>2.50</u>	\$ <u>2.85</u>	\$ <u>2.80</u>	\$ <u>0.30</u>	
Foreman	\$0.50 over Journey of the highest classification under his supervision					

(a) \$1.00 for CERTIFIED HAZARDOUS WASTE WORKER wearing a FULLY ENCAPSULATED SUIT OR CHEMICAL SPLASH SUIT when requiring SUPPLIED AIR.

**DEDUCTIONS:**

(Effective 03/01/96)

Dues Checkoff - \$0.25 per hour for all hours worked  
(Deducted from  
net wages)

**GROUP DEFINITIONS**

- | <u>GROUP</u> | <u>DEFINITION</u>  |
|--------------|--|
| 1            | Journeyman Cement Mason, (including, but not limited to, hand chipping and patching; all types grouting and pointing of all concrete construction; screed setting including screed pins; dry packing of all concrete including Embeco; plugging and filling all voids, etc., concrete construction; waterproofing of concrete with Thoroseal or similar materials), <b>HAZARDOUS WASTE WORKER.</b> |
| 2            | Cement Mason (Magnesite, terrazzo and mastic composition, two component epoxies; Clary and similar type screed operator; sandblasting of concrete for architectural finishes only; power shipping and bushhammer; all color concrete work; power trowel operator; power grinder operator; gunite and composition floor layer, <b>HAZARDOUS WASTE WORKER.</b>                                       |

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>ELECTRICAL WORKERS</u></b>						
<b><u>Inside Wiremen</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>20.97</u>	\$ <u>-0-</u>	\$ <u>1.50+(b)</u>	\$ <u>2.37</u>	\$ <u>(c)</u>	(a)
Foreman	\$ <u>23.07</u>	\$ <u>-0-</u>	\$ <u>1.50+(b)</u>	\$ <u>2.37</u>	\$ <u>(c)</u>	(a)
General Foreman	\$ <u>25.16</u>	\$ <u>-0-</u>	\$ <u>1.50+(b)</u>	\$ <u>2.37</u>	\$ <u>(c)</u>	(a)
(a) 8th Dist. Annuity Fund: \$ <u>1.75</u> ; (b) National Elec. Benefits Fund: <u>3%</u> of gross wages; (c) Inside Wiremen Apprenticeship Fund: <u>1.85%</u> of gross monthly payroll;						

**DEDUCTIONS:**

(d) Dues Checkoff - Inside Wireman:	<u>5%</u>
3rd-6th period Apprentices:	<u>5%</u>
1st-2nd period Apprentices:	<u>3%</u>

**ELECTRICAL WORKERS**

**Line Construction** (Effective 6/1/98 - 5/31/99)

Groundman	\$ <u>15.18</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)
Line Equip Op/Srvc	\$ <u>20.48</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)
Line Equip Mech/ Base Shop/Right of Way	\$ <u>20.48</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)
Lineman	\$ <u>24.03</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)
Cable Splicer	\$ <u>26.43</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)
Foreman	\$ <u>26.43</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)
General Foreman	\$ <u>28.21</u>	\$ <u>-0-</u>	\$ <u>2.70+(b)</u>	\$ <u>2.00</u>	\$ <u>(c)</u>	(a)

(a) 8th Dist. Annuity Fund:	\$ <u>0.30</u> ;
(b) National Elec. Benefits Fund:	<u>3%</u> of gross wages;
(c) Line Construction Apprenticeship Fund:	<u>.0125 (1.25%)</u> of gross labor rate.

**DEDUCTIONS:**

(d) Dues Checkoff - Line Construction:	<u>3%</u>
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**REQUIRED TOOL LIST:**

Knife; pencil; 12' or 16' tape; all pliers; keyhole saw handle; Wiggins and/or Multimeter Allen Wrenches through 3/8 inch; plumb bob; hand hammer; wood chisel; hacksaw frame; all screwdrivers; tool punch; crescent wrench, 8" or 10"; tool box; flashlight; center punch; wire strippers, small; level, small; small square; National Electrical Code, current.



**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>GLAZIERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>12.94</u>	\$ <u>(a)</u>	\$ <u>0.75</u>	\$ <u>1.75</u>	\$ <u>-0-</u>	
Foreman	Not less than 5% over Journeyman's rate.					

- (a) Receive 5 days paid vacation after 12 months' continuous service.  
Receive 10 days paid vacation after 24 months' continuous service

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>IRONWORKERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>19.03</u>	\$ <u>-0-</u>	\$ <u>2.60</u>	\$ <u>2.26</u>	\$ <u>0.07</u>	(a,b)
Foreman	\$ <u>20.99</u>	\$ <u>-0-</u>	\$ <u>2.60</u>	\$ <u>2.26</u>	\$ <u>0.07</u>	(a,b)
General Foreman	\$ <u>22.11</u>	\$ <u>-0-</u>	\$ <u>2.60</u>	\$ <u>2.26</u>	\$ <u>0.07</u>	(a,b)

(a) Training Fund: \$ 0.125 per hour

(b) Annuity Fund  
Ironworkers & Apprentices: \$ 3.00 per hour

**DEDUCTIONS:**

(c) Savings Bond Deduction: \$ 25.00 minimum per week  
Requires approved payroll deduction authorization form

(d) Dues Checkoff: \$ 3% of gross wages

**REQUIRED TOOL LIST:**

Pliers; hammer; rule; belt.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>TRAINING FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>LABORERS</u></b> (Effective 6/1/98 - 5/31/99)						
Group I	\$ 17.59 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group II	\$ 17.69 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group III	\$ 17.80 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group IV	\$ 17.91 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group V	\$ 17.96 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group VI	\$ 18.23 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group VII	\$ 18.50 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group VIII	\$ 17.85 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group IX	\$ 18.01 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Group X	\$ 18.12 (a)	\$ 1.00	\$ 2.00	\$ 2.50	\$ 0.20	
Foreman	\$0.50 over Journeyman of the highest Laborer classification under his supervision					
General Foreman	\$1.00 per hour above highest classification under his supervision					

(a) \$1.00 for CERTIFIED HAZARDOUS WASTE WORKER wearing a FULLY ENCAPSULATED SUIT OR CHEMICAL SPLASH SUIT when requiring SUPPLIED AIR.

**DEDUCTIONS:**

(Effective 06/01/96)

(b) Dues Checkoff - \$0.45 per hour for all hours worked  
(Deducted from net wages)

(c) 401(k) Plan: (Effective 1/1/99) The Employer shall provide for a voluntary deduction on an individual basis and forward to the employee's designated individual 401(k) account through the administrator of the existing Trust at no cost to the employer. The amounts that may be contributed will be in amounts of .25 cents; .50 cents; \$1.00; \$2.00; or \$3.00 per hour. The participant may change the amount of the contribution each time he/she is dispatched and on the first day of January, April, July or October. Contributions may be stopped at any time.

**GROUP DEFINITIONS**

- | <u>GROUP</u> | <u>DEFINITION</u>   |
|--------------|---|
| 1            | General Laborers, sloper clearing and grading, form stripper, concrete crew, concrete curing crew (by any means including covering, hardening compound and waterproofing), Carpenter tender, asphalt Laborer, hopper tender, flagman (including pilot car), watchman, heater tender, stake jumper, choker setter, spreader and weighman, power wheelbarrow, scouring concrete, rip rap man (hand placed), fence erector and installer - manual or mechanical (includes the installation and erection of fences, guard rails, median rails, reference posts, guide posts and right-of-way markers), crusher helper, cribbing and shoring (in open ditches), machinery & parts cleaner, leverman - manual or mechanical, demolition - salvage, landscaper, tool room man, janitor, <b>HAZARDOUS WASTE WORKER.</b> |
| 2            | Chuck tender, drill helper, air tampers, gunite nozzleman tender, pipe wrapper, tar pot tender, concrete sawyer, concrete grinder, signalman, handling cement, dumpman, steam nozzleman, air and water nozzleman (green cutter, concrete), vibrator (less than 4"), pumpcrete and grout pump crew, hydraulic monitor, hydro blaster, <b>HAZARDOUS WASTE WORKER.</b>   |

(Continued on next page)

**(LABORERS CONT.)**

**GROUP DEFINITIONS**

- | <b><u>GROUP</u></b> | <b><u>DEFINITION</u></b>   |
|---------------------|--|
| 3                   | Pipe layer including sewer, drainage, sprinkler systems and water lines, free air caisson, jackhammer, paving breaker, chipping gun concrete, powderman helper, asphalt raker, gasoline powered tamper, electric ballast tamper, sand blasting, form setter - airport paving, gunman (gunit), manhole setter, hand guided machines such as rotor tillers, trenchers, post hole diggers, walking garden tractors, etc., form setter (highway - curb and gutter), vibrator (4" and over), metal pan installer, cutting torch, <b>HAZARDOUS WASTE WORKER.</b> |
| 4                   | Hod carrier, mason tender, plasterer tender, mason tender, (concrete), terrazzo-tile tender, <b>HAZARDOUS WASTE WORKER</b>   |
| 5                   | Highscaler, wagon drill, grade checker, gunit nozzleman, timber faller and buckler, <b>HAZARDOUS WASTE WORKER.</b>   |
| 6                   | Diamond drill, drillers on drill with manufacturers rating 3" or over, certified pipe welder, <b>HAZARDOUS WASTE WORKER.</b>   |
| 7                   | Powderman, <b>HAZARDOUS WASTE WORKER.</b>  |
| 8                   | Underground reboundman, chuck tender, nipper, dumpman, vibrator (less than 4"), brakeman, muckers, bullgang, <b>HAZARDOUS WASTE WORKER.</b>  |
| 9                   | Underground form setter and mover, <b>HAZARDOUS WASTE WORKER.</b>  |
| 10                  | Underground minders, machinemen, timbermen, steelmen, drill doctors, spaders and tuggers, spilling and/or caisson workers, vibrator (over 4"), <b>HAZARDOUS WASTE WORKER.</b>  |

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPRENTICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>OPERATING ENGINEERS</u></b> (Effective 6/1/98 - 5/31/99)						
Group 1	\$ 20.02 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 2*	\$ 20.19 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 3	\$ 20.58 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 4	\$ 20.73 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 5*	\$ 21.10 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 6*	\$ 21.30 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 7*	\$ 21.68 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 8	\$ 21.93 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 9	\$ 22.18 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	
Group 10	\$ 22.43 (a)	\$ -0-	\$ 2.17	\$ 2.60	\$ 0.30	

Foreman \$0.50 over Journeyman of the highest classification under his supervision

General Foreman \$1.00 per hour above highest classification under his supervision

(a) \$1.00 for CERTIFIED HAZARDOUS WASTE WORKER wearing a FULLY ENCAPSULATED SUIT OR CHEMICAL SPLASH SUIT when requiring SUPPLIED AIR.

\* Groups 2, 5, 6, and 7 receive the following Long Boom pay:

- A. Crane Booms, 100 ft. to 150 ft., fifteen (15) cents over scale.
- B. Crane Booms, 150 ft. to 200 ft., thirty (30) cents over scale
- C. Crane Booms, over 200 ft., forty-five (45) cents over scale

**NOTE:** When the Crane Operator receives additional pay for long boom, the Oiler shall also receive such additional pay. In computing the length of the boom on Tower Cranes, they shall be measured from the base of the tower to the point of the boom.

**GROUP DEFINITIONS**

- | <u>GROUP</u> | <u>DEFINITION</u>  |
|--------------|--|
| 1            | Brakeman, crusher plant feeder (mechanical), deckhand, drill helper, grade checker, heater tender, land plane, pumpman, rear chainman, <b>HAZARDOUS WASTE WORKER.</b>  |
| 2            | Air compressor, assistant refrigeration plant operator, bell boy, bit grinder operator, blower operator (cement), bolt threader machine operator, broom, cement hog, concrete mixer, concrete saw - multiple cut, discing - harrowing or mulching (regardless of motive power), distributor leverman, drill steel threader machine operator, fireman - all, heavy duty mechanic helper or welder helper, hoist - single drum, hydraulic monitor operator - skid mounted, oiler (single piece of equipment), crusher oiler, pugmixer - box operator, spray curing machine, tractor - rubber tired farm type using attachments, <b>HAZARDOUS WASTE WORKER.</b> |

(Continued on next page)

**(OPERATING ENGINEERS CONT.)**

<b><u>GROUP</u></b>	<b><u>GROUP DEFINITIONS</u></b> <b><u>DEFINITION</u></b>
3	A-frame truck (hydra lift, Swedish cranes, Ross Carrier, hyster on construction jobs), battery tunnel locomotive, belt finishing machine, cable tenders (underground), chip spreader machine (self-propelled), head chainman, hoist - 2 or more drums or tower hoist, hydralift - fork lift and similar (when hoisting), oilers (underground), power loader (bucket elevator, conveyors), rodman, road roller (regardless of motive power), <b>HAZARDOUS WASTE WORKER</b>
4	Boring machines (earth or rock), quarry master - Joy - tractor mounted, Drills: Churn - Core - Calyx or Diamond, front end or overhead loaders and similar machines - (up to and including 4 yds.) - (rubber tired), grout pump, hydra-hammer, locomotive engineer, longitudinal float machine, mixermobile, spreader machine, tractor - rubber tired - using backhoe, transverse finishing machine, trenching machines, Waggoner Compactor and similar, asphalt spreaders, <b>HAZARDOUS WASTE WORKER</b>
5	Concrete plant operator, concrete road paver, (dual), elevating grader operator, Euclid elevating loader, generator plant operator - mechanic (diesel electric), post hole auger or punch operator, power shovels, backhoes and draglines - under 3/4 yd., pumpcrete, refrigeration plant operator, road roller (finishing high type pavement), service oiler, skidder - rubber tired, sub grader, instrument man, multiple station belt line operator, screed operator, <b>HAZARDOUS WASTE WORKER</b>
6	Asphalt pavers - self-prop., asphalt plant operator, blade operator (motor patrol), concrete slip form paver, cranes - up to and including 50 ton, crusher plant operator, derrick operator, drilling equipment (bit under 8") - (Robbins Reverse Circulation and similar), front end & overhead loader & similar machines (over 4 yds. & including 7 yds.), Koehring scooper, heavy duty mechanic or welder, mucking machine (underground), multi-batch concrete plant operator, piledriver engineer, power shovels, backhoes and draglines (3/4 yd. to and including 3 1/2 yds.), tractor - crawler type - including all attachments, refrigeration plant operator (over 1,000 tons), trimmer machine operator, concrete pump boom truck, all scrapers (up to and including 40 yds.), <b>HAZARDOUS WASTE WORKER</b>
7	Tower Crane operator, cableway operator, continuous excavator (Barber-Greene WL-50), cranes - over 50 ton, dredges, drilling equipment (bit 8" and over) - (Robbins Reverse circulation & similar), fine grader - CMI equivalent, front end & overhead loaders & similar machines - (over 7 yds.), power shovels & draglines over 3 1/2 yds., quad type tractors with all attachments, all scrapers, pulling wagons, belly dumps and attachments (over 40 yds. to and including 60 yds.), multiple scraper units, <b>HAZARDOUS WASTE WORKER</b>
8	Scrapers - Euclid & similar pulling wagons, belly dumps and attachments (over 60 yds. to and including 80 yds.), <b>HAZARDOUS WASTE WORKER</b>
9	Scrapers - Euclid & similar pulling wagons, belly dumps and attachments (over 80 yds. to and including 100 yds.), <b>HAZARDOUS WASTE WORKER</b>
10	Scrapers - Euclid & similar pulling wagons, belly dumps and attachments (over 100 yds.), <b>HAZARDOUS WASTE WORKER</b>

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>PAINTERS, TAPERS &amp; SOFT FLOOR LAYERS</u></b> (Effective 6/1/98 - 5/31/99)						
Painters and Tapers	\$ <u>19.85</u>	\$ <u>-0-</u>	\$ <u>1.25</u>	\$ <u>2.31</u>	\$ <u>0.02</u>	
Foreman	5% over Journeyman of the highest classification under his supervision.					

**DEDUCTIONS:**

- (a) Dues Checkoff: 4% of gross wages.  
(Effective 10/01/96)

**REQUIRED TOOL LIST:**

Hammer; broad knife (3" or 4"); putty knife; screwdriver; and 4" duster.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>PIPEFITTERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>23.95</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	
Welder, Nonde- structive Testing	\$ <u>26.04</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	
Material Man	\$ <u>26.04</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	
Pipe Bender, Process Piping	\$ <u>26.04</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	
Detail Man	\$ <u>26.04</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	
Foreman	\$ <u>26.97</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	
General Foreman	\$ <u>28.60</u>	\$ <u>-0-</u>	\$ <u>3.41</u> (a)	\$ <u>3.04</u>	\$ <u>0.27</u> (b)	

(a) National Pension Fund: \$ 1.25  
State Pension Fund: \$ 2.16

(b) Training Fund: \$ 0.22  
U.A. Training Fund: \$ 0.05

**DEDUCTIONS:**

(c) Idaho State Pipe Trades Assessment Fund: \$ 0.17 per hour

(d) Dues Check-Off (effective 5/1/97) 5% of actual hrs. worked, not to exceed 40 hrs. per week,  
based on the basic Journeyman & Apprentices wage rate.



**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>ROOFERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>15.75</u>	\$ <u>-0-</u>	\$ <u>3.05</u>	\$ <u>2.90</u>	\$ <u>-0-</u>	
Foreman	\$ <u>16.50</u>	\$ <u>-0-</u>	\$ <u>3.05</u>	\$ <u>2.90</u>	\$ <u>-0-</u>	

**DEDUCTIONS:**

- (a) Dues Checkoff:       \$ 0.50 per hour
- (b) Working Assessment:   \$ 0.20 per hour

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPRENTICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>SHEET METAL WORKERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>21.21</u>	\$ <u>(e)</u>	\$ <u>2.47 + (d)</u>	\$ <u>2.35</u>	\$ <u>0.37 (a)</u>	(b,c)
Foreman	\$ <u>22.51</u>	\$ <u>(e)</u>	\$ <u>2.47 + (d)</u>	\$ <u>2.35</u>	\$ <u>0.37 (a)</u>	(b,c)
General Foreman	\$ <u>23.81</u>	\$ <u>(e)</u>	\$ <u>2.47 + (d)</u>	\$ <u>2.35</u>	\$ <u>0.37 (a)</u>	(b,c)

(a) National Training Fund: \$ 0.07 per hour  
Local Training Fund: \$ 0.30 per hour

(b) \$ 0.02 per hour for each hour worked by each employee is paid to the Sheet Metal Occupational Health Institute Trust.

(c) 3% of the gross wages + Pension Fund + Health & Welfare is paid to SASMI.

(d) \$ 0.25 per hour for N.W. 401 (K) Plan

**DEDUCTIONS:**

(e) Vacation: \$ 1.00 (Vacation is not withheld from Apprentice wages)  
PAL: \$ 0.02 (Requires approval of employee)

(f) Employee Organization Dues: \$ 0.50 per hour worked  
(Deducted from gross wages)

(g) Contractor agrees to allow voluntary deductions into Northwest Sheet Metal Workers Supplemental Pension Trust (401(K) plan of \$0.50, \$1.00, \$2.00, or \$300.  
Employee must complete and sign a form authorizing these deductions and electing amount to be deducted, upon hire.  
Employee must give 30 days written notice of cancellation.  
Employee may enter or change deduction on March 1, and September 1, of each year.

**REQUIRED TOOL LIST:**

Snips R. & L.; 1 pr. bull dog snips; 1 set trammel points; 1 small dolly; 1 plumb bob and chalk box; 1 pr. 8" dividers; 1 hacksaw frame; 1 pr. square nose pliers; 1 sheet metal hammer; 1 pr. tongs; 1 6" screwdriver; 1 6" Phillips screwdriver; 1 hand pipe crimper; bench snips (at least Wiss #18); 1 1/8 hand pop riveter; 1 dove tailer; 2 vise grips; 1 12 ft. steel tape; 1 8" crescent wrench; and 1 scratch awl.

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>SPRINKLER FITTERS</u></b> (Effective 6/1/98 - 5/31/99)						
Journeyman	\$ <u>23.30</u>	\$ <u>-0-</u>	\$ <u>3.25</u> (a)	\$ <u>3.40</u>	\$ <u>0.20</u>	
Foreman	\$ <u>24.80</u>	\$ <u>-0-</u>	\$ <u>3.25</u> (a)	\$ <u>3.40</u>	\$ <u>0.20</u>	

(a) NASI: \$ 2.25  
 Supplemental Pension Plan: \$ 1.00  
 (Fund may be modified by Union)

**DEDUCTIONS:**

Dues Checkoff: 2.5% of gross wages

**APPENDIX A**  
**CLASSIFICATIONS, WAGES & BENEFITS**

<u>UNION</u>	<u>BASE RATE</u>	<u>VACATION FUND</u>	<u>PENSION FUND</u>	<u>HEALTH &amp; WELFARE</u>	<u>APPREN- TICESHIP FUND</u>	<u>OTHER (SEE NOTE#)</u>
<b><u>TEAMSTERS</u></b> (Effective 6/1/98 - 5/31/99)						
Group 1	\$ <u>18.14</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 2	\$ <u>18.55</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 3	\$ <u>18.78</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 4	\$ <u>18.98</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 5A	\$ <u>18.78</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 5B	\$ <u>18.98</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 5C	\$ <u>19.23</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 5D	\$ <u>19.78</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 5E	\$ <u>20.02</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Group 5F	\$ <u>20.50</u> (a)	\$ <u>1.00</u>	\$ <u>2.40</u> (b)	\$ <u>3.23</u>	\$ <u>0.25</u>	
Foreman	\$0.50 per hour over highest paid Teamster classification supervised.					

(a) \$1.00 for CERTIFIED HAZARDOUS WASTE WORKER wearing a FULLY ENCAPSULATED SUIT OR CHEMICAL SPLASH SUIT when requiring SUPPLIED AIR.

(b) Basic Plan of Benefits: \$ 2.15  
Program for Enhanced Early Retirement (PEER): \$ 0.25

**NOTE:** Two or four wheeled power tractor with trailer, i.e., Tournatrailer, Athey Wagon, Terra Cobras, Letourneaus, Westinghouse; DW-10, 20, 21, and 24; 619C and similar type equipment when transporting material loaded by external means; also power boom and similar type trucks when performing work within the Teamster jurisdiction, regardless of types of attachment - **Base rate from Group 4 or yardage scale from Group 5, whichever is greater.**

(Continued on next page)

(TEAMSTERS CONT.)

GROUP DEFINITIONS

<u>GROUP</u>	<u>DEFINITION</u>
1	Leverman loading at bunkers, pilot car or escort drivers, flat bed - 2 axle and pickup hauling material, water tank truck (1,000 gallons and under), ambulance driver, flat bed - 3 axle, fuel truck (1,000 gallons and under), greaser, tireman, serviceman buggymobile, man haul (shuttle truck or bus), <b>HAZARDOUS WASTE WORKER.</b>
2	Truck helpers, slurry or concrete pumping truck; flat bed using power takeoff, semi-trailer - low boy - up to 96,000 lbs., GVW; bulk cement tanker - up to 96,000 lbs., GVW; fork lift (bull lift, hydro lift); Ross hyster and similar straddle equipment; "A" frame truck (Swedish crane, Iowa 3,000, Hydro-lift); warehouseman - loading and unloading; forklift, <b>HAZARDOUS WASTE WORKER.</b>
3	Water tank truck; fuel truck, over 1,000 gallon; transit mix truck - 0-10 yards; dumptrucks; warehouseman; counterman, shipping; receiving; cardex; distributor or spreader trucks; field tireman - serviceman, snow plow (truck mounted), <b>HAZARDOUS WASTE WORKER.</b>
4	Low boy (96,000 lbs., GVW & over); bulk cement tanker (96,000 lbs., GVW & over); warehouseman general; transit mix truck (over 10 yds.); Turnarocker and similar equipment, <b>HAZARDOUS WASTE WORKER.</b>
5A	Truck - side, end and bottom dump (0-16 yds. inclusive); <b>HAZARDOUS WASTE WORKER.</b>
5B	Truck - side, end and bottom dump (16-30 yds. inclusive); <b>HAZARDOUS WASTE WORKER.</b>
5C	Truck - side, end and bottom dump (30-50 yds. inclusive); Truck mechanic; <b>HAZARDOUS WASTE WORKER.</b>
5D	Truck - side, end and bottom dump (50-75 yds. inclusive); <b>HAZARDOUS WASTE WORKER.</b>
5E	Truck - side, end and bottom dump (75-100 yds. inclusive); <b>HAZARDOUS WASTE WORKER.</b>
5F	Truck - side, end and bottom dump (over 100 yds.); <b>HAZARDOUS WASTE WORKER.</b>

**APPENDIX B**  
**(Sample)**  
**Alternating 4-10 Hours Shifts**

<b>A&amp;B - Day Shifts</b>	<b><u>Sun.</u></b>	<b><u>Mon.</u></b>	<b><u>Tues.</u></b>	<b><u>Wed.</u></b>	<b><u>Thur.</u></b>	<b><u>Fri.</u></b>	<b><u>Sat.</u></b>
1st Shift	A	A	A	A	B	B	B
	1	2	3	4	5	6	7
2nd Shift	C	C	C	C	D	D	D
1st Shift	B	A	A	A	A	B	B
	8	9	10	11	12	13	14
2nd Shift	D	C	C	C	C	D	D
1st Shift	B	B	A	A	A	A	B
	15	16	17	18	19	20	21
2nd Shift	D	D	C	C	C	C	D
1st Shift	B	B	B	A	A	A	A
	22	23	24	25	26	27	28
2nd Shift	D	D	D	C	C	C	C
1st Shift	B	B	B				
	29	30	31				
2nd Shift	D	D	D				

**A and B - Day Shifts**

**C and D - Second Shifts**

## APPENDIX C

It is understood that situations may arise which will require closing down some or all operations within the TERRITORY. An agreement is hereby set forth concerning the obligations of EMPLOYERS and EMPLOYEES under these conditions.

### THE EMPLOYER WILL:

1. Make every attempt to notify EMPLOYEES as early as possible of the occurrence of such situations and if the EMPLOYEE will be required to report to work and where they are to report
2. If notification cannot be made prior to the end of shift for the next day, notification will be made by telephone and fax two (2) hours prior to the shift to be cancelled on the following radio stations: KID AM/FM; KUPI AM/FM; KLCE FM.

Notification by fax only will be sent to the following radio stations: KZBQ AM; KSEI AM/FM; KWIK AM; KPKY FM; KADQ FM; KFTZ FM.

Television stations Channels 3,6 and 8 will not be used for relaying information for employees before 7:00 a.m. There normally is not anyone at the stations early enough to take the information and get it on the air. Any announcements later in the day, from 8:00 a.m. until 10:00 p.m., will be provided to the television stations for broadcast as well as radio stations.

3. Set up a reporting station, normally in the CFRA cafeteria, which will be manned to sign in any EMPLOYEES who report to work where proper notification has not been given.
4. Inform each EMPLOYEE as to whether he or she is to go home or remain at work.
5. Pay EMPLOYEES according to this AGREEMENT.
6. In the event emergency closing occurs on a designated payday, the EMPLOYER will deliver paychecks to the appropriate union hall for distribution, or by mail, provided the EMPLOYER has access to payroll records.
7. Be responsible for notifying their EMPLOYEES of this procedure.
8. Notify EMPLOYEES when to return to work

### THE CRAFT EMPLOYEES WILL;

1. Be responsible to monitor one of the radio or TV stations listed above in his or her area on a routine basis.
2. Not report to work if instructed in the radio or TV stations listed above in his or her area on a routine basis
3. In the event he or she reports to work and is unable to reach his or her work location, report to the CFA cafeteria to the reporting station of his or her EMPLOYER for sign-in and instruction.

**NOTE: This policy replaces all previous procedures.**

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INEL SITE STABILIZATION AGREEMENT

03/01/95

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
1.	Coordinator Agreement (not Published)	Article XI P. 6	Executive Board	4/30/85
2.	<u>Local Area Agreement</u> 1) The term "Local or area contract negotiation" refers to locally negotiated Bargaining agreements. 2) Locally negotiated Bargaining Agreements shall be interpreted as Construction Agreements affecting the Site Stabilization Agreement and having been recognized as such by the Executive Board.	Appendix A p. 23	Executive Board	10/02/84 6/28/88
3.	Appendix A Working Conditions	Appendix A p.23	Executive Board	10/22/84
4.	<u>"Me Too" Clauses</u> Where a "me too" clause exists in a local collective bargaining agreement, it will be part of the wages. It is not listed, the "me too" will not apply	Article XVIII p. 15	Executive Board	11/07/84
5.	<u>Payoff at Layoff</u> In the event of a termination other than a quit, the employee will be paid at time of termination.	Appendix A #9; p.23	Executive Board	11/07/84
6.	<u>Drinking Water</u> The employer shall make available, cool, potable; drinking water at all times.	Appendix A #2; p. 23	Executive Board	11/07/84
7.	<u>Foreman</u> The language set forth in #5 is self-explanatory. Foreman will be employed as required in #12 of Article XVI, of the Agreement, and there will always be a foreman responsible for employees as required by Article XVI, #1; however one foreman may supervise more than one crew	Article XVI #5 & #12, p.9	Executive Board	03/07/85 03/21/90

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC. PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
8.	Executive Committee Rules and Procedures (Not Published)	Article XXIII p. 20	Executive Board	03/07/85
9.	<u>Notification of Executive Committee Meetings</u> Notification by regular mail is acceptable	Article XXIII p. 20	Executive Board	04/30/85
10.	<u>Painters Steel pay</u> Approved as a classification	Appendix A p. 31	Executive Board	05/29/85
11.	Void			
12.	<u>Overtime For Time Outside Shift Hours</u> Any time worked before or after the established shift shall be paid at the applicable overtime rate. Should any employee show up late through no fault of the employer, 8 hours work will be performed before the overtime rate is applicable, within the shift parameters.  If on the other hand, the employer directs employees to report late, overtime will be paid after the first 8 hours of the established shift.	Article XVII #2, p.11	Executive Board  Grievance Board	05/29/85  10/24/94
13.	<u>Union Changing Manpower Request</u> The Union does not have the right to change a manpower request	Article XIV p. 7	Executive Board	07/17/85

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
14.	<u>Qualified Workman</u> (a) A contractor has the right to call the union hall for a worker with "special skills or qualifications" and the union hall is required to furnish a qualified person  Contractors should be encouraged to file grievances against unions that send out unqualified individuals who do not meet special requirements. Contractors are advised to be more specific when placing job orders.  (b) Radiation and respirator training are not special skills or qualifications.	Article XIV p. 8	Executive Board          Executive Board	07/17/85          06/28/88
15.	<u>Payday</u> In the event the designated payday occurs during an Employee's scheduled non-working day, (i.e., 4-10's), the Employee may pick up his pay at the Employer's (southeast Idaho) business office during normal office hours on the designated pay day or consecutive scheduled non-working days until the Employee's next scheduled working day, at which time the pay will be payable at the jobsite during working hours. If the Employee fails to pick up his pay at the end of the next payday, the pay will be sent by certified mail to the last designated address.  It is not the intent that the Employer be required to establish more than one payday per week.  <b>Note: This item has been revised to: Payday will fall on a normal workday. The rest of this item will be disregarded entirely.</b>	Appendix A #16, p. 24	Executive Board Bingham Mechanical/UA	08/28/85  08/02/85
			Executive Board	11/20/95
16.	<u>Start of Work Week</u> The normal work week begins at 12:00 a.m. Monday morning and ends at 12:00 p.m. Friday.	Article XVII #2, p. 11	Executive Board Laborers, IUOE/Ebasco	02/13/91 01/16/91

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>Agree. Sec. PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
17.	UA Tenure (Not Published)	Article XVI #10, p. 9		
18.	Agreement Funding Arrangement (Not Published)	Article XI p.6		
19.	<u>Shift Interpretation</u> Overtime will be paid when multiple shifts are working in a given 24 hour period	Article XVII #2, p.11	UA/Carillo Plumbing	02/25/85
20.	<u>Loitering</u> Loitering on the job is a management responsibility (under Article VI) to correct	Article VI p. 3	Executive Board	11/07/84
21.	<u>Time Between Shifts</u> The interval between shifts worked in the same day shall not exceed the reasonable time necessary to change shifts and in no event shall it exceed 1 hour.	Article XVII #2,c; p. 11	Executive Board	11/07/84
22.	<u>Starting Time</u> Contractors and Unions can mutually agree to the starting and quitting time of a shift.	Article XVII #2, a,b,c; p. 11	Executive Board	02/04/86
	Contractors & Union may establish a 4-day work week with 10-hour shifts with no premium pay, on a Monday through Thursday or Tuesday through Friday basis		Executive Board	07/14/93
	Shifts shall be established and continue for a minimum of 5/8-hour consecutive work days or 4/10-hour consecutive work days, or applicable overtime rate will be paid. If Saturday and/or Sunday are worked they shall be included in the 5/8- hour or 4/10-hour day minimum period with applicable overtime rate paid.	#2,b; p. 11	Executive Board	02/23/94 04/27/94
	This item is changed to allow a 4-10 shift. With no premium pay at the Employer's Option during the Daylight Savings Time period. The shift will be on a Monday through Thursday basis with no make-up days. The first 10 hours worked on Friday will be at time- and -a half. The 4-10 shift hours shall be between 5:00 a.m. and 6:00 p.m. for the day shift; and between 5:00 p.m. and 6:00 a.m. on the second or swing shift, with 9 ½ hours worked for 10 hours pay of the second shift.		Executive Board	11/20/95
23.	<u>Shifts Established by Individual Crafts</u> Shifts shall be established on an individual craft basis.	Article XVII #2, b; p.11	Ironworkers, IUOE/ MK-Ferguson	02/20/87

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
24.	<u>Grievance Procedure</u>	Article XX #4, p. 17	UA/WINCO	09/11/86
	(a) Grievance was filed timely even though spool pieces had been fabricated some time before the grievance was filed. The Board felt the union had no reason to know the work by WINCO had been done.			
	(b) After occurrence, 5 working days are allowed for discovery and contact of the Respondent party. Within 1 working day, after contact, the grievance is to be reduced to writing. After being reduced to writing, the Grievance is given 5 working days to transmit (preferably by certified mail) the written grievance to Coordinator and Respondent.	Article XX p.17	Executive Board	08/15/86 09/17/91
	(c) The Coordinator, within 10 Days, then attempts to resolve the grievance between the Grievant and Respondent. If the grievance is not resolved with the help of the Coordinator, either party has 5 days to request, in writing, a Grievance Board of Adjustment hearing. If the Grievance Board of Adjustment is requested, a hearing shall be scheduled within 5 working days of receipt of written notice.			

5  
Discovery/  
contact

1  
Writing

5  
Send written  
notice

10  
Coordinator

5  
Ask for board

5  
Hearing



**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
25.	<p><u>Union Security</u> Effective <u>August 1, 1989</u>, Article XV, Union Security, is of no effect through the application of the Idaho Right-to-Work law. Should this law be repealed, or should it be rendered invalid by a court of competent jurisdiction, Article XV shall be reinstated upon written request by the Unions who are parties to this Letter of Understanding.</p>	Article XV p. 8	Executive Board	10/27/87
26.	<p><u>Duration</u> The parties agree to extend the INEL Site Stabilization Agreement from <u>July 31, 1989</u> through <u>August 1, 1994</u></p> <p>The terms and conditions of the agreement remain unchanged except to the extent necessary to comply with State and/or Federal law.</p> <p>The EXTENSION shall be effective as of the 1<sup>st</sup> day of August, 1989, and shall remain in effect until the <u>31<sup>st</sup> day of July, 1994</u>, and shall continue from year to year thereafter unless the Employers or Unions give written notice to the other of a desire to terminate, amend or change the Agreement. Such written notice must be given not less than sixty (60) days nor more than ninety (90) days prior to <u>July 31<sup>st</sup>, 1994</u> or <u>July 31<sup>st</sup></u> of any succeeding year.</p>	Article XXV p. 21	Executive Board	10/27/87

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
26(a).	<p><u>Duration</u></p> <p>The parties agree to extend the INEL Site Stabilization Agreement from <u>July 31, 1994</u>, though <u>August 1, 1999</u>.</p> <p>The terms and conditions of the agreement remain unchanged except to the extent necessary to comply with State and/or Federal law</p> <p>The EXTENSION shall be effective as of the <u>1<sup>st</sup> day of August, 1994</u>, and shall remain in effect until the <u>31<sup>st</sup> day of July, 1999</u>, and shall continue from year to year thereafter unless the Employers or Unions give written notice to the other of a desire to terminate, amend or change the Agreement. Such written notice must be given not less than sixty (60) days nor more than ninety (90) days prior to <u>July 31, 1999</u> or <u>July 31<sup>st</sup></u> of any succeeding year.</p>	Article XXV p. 21	Executive Board	07/14/93
27.	<p><u>Holidays that fall on Saturday</u></p> <p>The language stands as written</p>	Article XVII p.12	Executive Board	06/28/88
28.	<p><u>U.A. Welder Rates</u></p> <p>These rates are a classification in the local bargaining agreement and as such stand-just like any other classification.</p>	Appendix A p. 23	Executive Board	06/28/88
29.	<p><u>Established C.I.R.</u></p> <p>Council of Industrial Relations Those Unions with and established C.I.R. should solve Site grievances through the Site Stabilization Agreement procedure</p>	Article XX Sec. 4; p. 17	Executive Board	06/28/88

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
30.	<u>Per Diem</u> Until a <i>bona fide</i> bus system is provided, the employee will receive <i>per diem</i> for travel regardless of what the individual rides in.  The Board determined that the Agreement addresses transportation provided by Employer during work hours. "No <i>per diem</i> will be paid if Employee travels to and from the Territory in Employer provided transportation during the designated shift hours."	Article XVII p. 14	Executive Board	06/28/88
31.	<u>Right to Work</u> A signatory contractor's lower tiers must be signatory to the Site Stabilization Agreement and must, therefore, use the hiring hall procedure of the local unions	Article XV p. 8	Executive Board	06/28/88
32.	<u>Overtime on Non-consecutive Days</u> When a contractor does not run a 2 <sup>nd</sup> shift for 5 consecutive days, overtime is to paid on a basis as if it was Saturday work.	Article XVII #5; p. 13	Executive Board	12/11/89
33.	<u>Training and Medical Exams</u> Training and Medical examinations related to construction work are covered by the INEL Site Stabilization Agreement, including <i>per diem</i> .	Appendix A Work Cond. #17; p. 24	Executive Board	01/03/91 02/13/91 06/23/93
34.	<u>Wages &amp; Benefits, CLRC</u> Wage rates and fringe benefit contributions shall be established on an annual basis, using percentage changes supplied by the Construction Labor Research Council (CLRC). The percentage of the modification shall be for both wages and benefits and the distribution of amounts shall be established be the individual Union and Fund Managing Board. (Continued on next page)	Article XVIII p. 15	Executive Board	01/14/93 02/23/94

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
34.	(continued) Changes shall be effective June 1 of any year. The CLRC is to notify the Coordinator by April 1 of the affected year. The Coordinator will in turn, notify the Unions and the Contractors. Prior to the June 1 change in wage rates and/or benefits, the Unions shall notify the Coordinator of the distribution of the percentage change. The Coordinator will then notify the signatory contractors. If, after notification by the unions of the distribution, the distribution amounts must be changed, the Union must notify the Coordinator of such change prior to the change.			
35.	<u>Drug Testing</u> (See attached INEL Substance Abuse Program – SSA Language and the INEL Workplace Substance Abuse Program)	Article XXI	Executive Board	08/23/95

INEL WORKPLACE SUBSTANCE ABUSE PROGRAM  
SSA LANGUAGE

The Employers and Unions are committed to the establishment of a safe and efficient work environment for all employees free from the effects of alcohol, illegal drugs, other controlled substances, and prohibited items. This procedure established the guidelines applicable to all contractor operations.

This procedure prohibits the use, possession, concealment, transportation, promotion or sale of the following items or substances in areas covered by this Agreement:

Illegal drugs, designer and synthetic drugs, prohibited drugs and drug-related paraphernalia.

Controlled substances such as medications when usage is abused.

Alcoholic beverages.

Employees who violate the established INEL Workplace Substance Abuse Program will be subject to disciplinary action up to and including termination.

The Employers reserve the right to establish drug and/or alcohol search and screening procedures consistent with applicable provisions of this Agreement, state and federal laws, and Department of Energy regulations.

The Employers shall be responsible for the implementation and administration of the attached INEL Workplace Substance Abuse Program.

Substance abuse awareness and control is a joint responsibility. Employer managers will be trained in abuse recognition and be qualified to deal with impaired personnel.

Each employee shall be responsible for notifying the individual Employer of any criminal drug statute arrest or conviction promptly after such arrest or conviction.

The Employers undertake no obligation to pay for any rehabilitation, counseling, and/or treatment cost incurred by an individual meeting the requirements of the INEL Workplace Substance Abuse Program.

**FOOTNOTES OF INTERPRETATIONS AND CLARIFICATION  
OF THE  
INEL SITE STABILIZATION AGREEMENT**

<u>NO</u>	<u>ITEM</u>	<u>AGREE. SEC.</u> <u>PAGE NO.</u>	<u>SOURCE</u>	<u>DATE</u>
36.	<u>Initial Check In</u> (See minutes for further clarification)	Article XIV p. 8	Executive Board	11/19/96

## INEL WORKPLACE SUBSTANCE ABUSE PROGRAM

### I. Policy Statement

It is the policy of the Operating Contractor and all Construction Companies performing work at the INEL to maintain a drug-free workplace. The illegal use of drugs, on or off duty, is inconsistent with law-abiding behavior expected of all citizens. The use of illegal drugs, or abuse of alcohol or prescription drugs may impair the ability of construction personnel to perform tasks that are critical to proper work performance. The result is an increase in accidents and failures, which pose a serious threat to the safety of all employees, subcontractors, visitors and the general public. Impaired employees also tend to be less reliable and prove to have greater absenteeism resulting in the potential for increased cost and delays in the timely completion of construction contracts/projects.

Furthermore, employees have the right to work in a drug free environment and to work with persons free from the effects of drugs and alcohol. Employees who abuse alcohol or drugs are a danger to themselves and to other employees.

Therefore, the Operating Contractor and the Construction Contractors will not hire or retain employees who use, possess, or sell illegal substances. Additionally, we will not tolerate abuse of legal substances that adversely effect work productivity, safety, or an employee's overall performance.

### II. Construction companies

The requirements for the INEL Workplace Substance Abuse Program are incorporated in the Operating Contractor's terms and conditions for all subcontractors. Construction companies will use the Operating Contractor's Occupational Medical Program (OMP) to implement the urine collection\testing requirements of this policy. If applicable, subcontractors must comply with the criteria outlined in 10 CFR 707 and DOT 49 CFR 40 and 49 CFR 382.

### III. Testing Circumstances

#### 1. Testing Designated Positions (TDPs) and DOT positions:

Those positions identified as TDPs as required by 10 CFR 707 or those identified for alcohol testing under DOT 49 CFR 40 and 49 CFR 382.

#### 2. Pre-employment Testing:

Prior to the start of employment, prospective employees will be asked to provide a urine sample to test for the presence of Substance Abuse and Mental Health Services Administration (SAMHSA) five drug-screen substances. Presence of one or more of these substances will be cause for rejection of employment. Applicants who test positive, or attempt to circumvent or falsify a substance abuse screening test, will be denied site access for a period of one year. Prospective employees who test positive but complies with Section VII of this program may work at the INEL Site after 90 calendar days. Refusal to provide a sample for the test will be considered voluntary withdrawal of consideration for employment. If the medical facility cannot provide test results prior to the scheduled reporting date, employment will be considered probationary until the test results are known to Employer.

Once a pre-employment test is performed and the results are negative, a construction employee will be issued a Clean Card" and may move from one construction company working at the INEL Site to another without needing another pre-employment test as long as there is not more than a 90 calendar days lapse period working at the Site. If the individual has not worked at the Site for 90 calendar days or more, then a new pre-employment test will be required.

#### 3 Reasonable Suspicion Testing:

Employees may be tested if their behavior creates the basis for reasonable suspicion of the use of drugs or alcohol. The concurrence of the employee's manager, Operating Contractor's Legal Department, and the INEL Medical Director is required prior to testing someone for reasonable suspicion. Reasonable suspicion is a good faith belief that an employee is impaired in some way based on facts such as the following:

- (1) Direct observation of drug or substance abuse
- (2) The physical symptoms of being under the influence of a drug and/or alcohol



- (3) A pattern of abnormal conduct or erratic behavior consistent with substance/alcohol abuse
- (4) Arrest or conviction for a drug related offense
- (5) Identification of any employee as the focus of a drug related criminal investigation (e.g., illegal drug possession, use, or trafficking)
- (G) Evidence that the employee has tampered with a drug test

Evaluation of aberrant behavior should be referred to the INEL OMP when that behavior effects the employee's job performance or the performance of other employees. Inappropriate or unacceptable behavior in the workplace is failure to perform one's job, or the impairment of judgement or reliability needed to perform a job, in a secure and safe manner.

#### 4. Occurrence Testing:

When there is an occurrence, especially those which are required to be reported to DOE-ID (DOE Order 5000.3B), it may be necessary to test an employee for the use of illegal drugs, and/or alcohol, if in the opinion of management such individual could have caused or contributed to the conditions which caused the occurrence. Testing may occur following serious or potentially serious accidents or incidents in which results in an personnel injury, safety precautions were violated, equipment or property was damaged, unusually careless acts were performed, or where the cause was due to an employee's or other person's failure to wear prescribed personal protective equipment or follow prescribed safety rules while working on Company premises or the property of a customer.

#### IV. Drug Testing

The INEL OMP contracts with a SAMHSA certified drug-testing laboratory to test the specimens collected. Specimens are currently tested in accordance with SAMHSA guidelines, for the following drugs: Marijuana, Cocaine, Opiates, Amphetamines, and Phencyclidine.

Consent by employees to submit to a screening test in accordance with this policy is a condition of employment. Employees who refuse to be tested or attempt to circumvent or falsify a substance abuse screening test will be suspended without pay pending final disciplinary action.

An employee suspected of being under the influence of a prohibited substance and/or alcohol may, for reasons of safety, be suspended without pay until test results are available. If the test proves negative, the employee will be reinstated with back pay.

An Employee being tested for either Reasonable Suspicion or for an Occurrence as outlined in Section III above, will have a split sample test conducted

The contractors reserves the right to test for any additional drugs listed in Schedules I and II of the Controlled Substance Act and for alcohol.

V. Positive Drug Test Confirmation and MRO Determination

A test result that is positive on an initial, FDA-approved prescreen at a SAMHSA certified testing laboratory, and confirmed as positive by that laboratory, will be reviewed by the INEL OMP Medical Review Officer (MRO). The MRO will determine if the test result is MRO positive (no legitimate medical reason for positive laboratory result), or MRO negative (those where a legitimate medical reason for the positive laboratory result exists)

The MRO will inform a person whose drug screen is found to be positive of the right to have the original sample re-tested. If the donor elects to have a retest performed, the donor will have the option to have the retest done at the original SAMSHA certified test laboratory, or at another SAMSHA certified laboratory at his/her expense. If the retest proves negative, the employee will be reinstated with appropriate back pay.

VI. Consequences of Possession Sale. or Manufacture of Drugs

An employee who possesses, sells, or manufactures illegal drugs in the workplace will be grounds for termination.

## VII. Consequences of a Positive Drug Test

After management verifies that all procedural requirements and considerations have been met, the employee will be placed on disciplinary time off without pay for not less than 30 calendar days and 90 calendar days for individuals testing positive under the pre-employment test. Under appropriate circumstances, disciplinary action up to and including termination may be administered.

If the results are the first positive drug screen for that employee and no other circumstances exist which warrant otherwise, the following sanctions will generally be applied.

- (1) Disciplinary time off without pay for not less than 30 calendar days for employee and 90 calendar days for individuals testing positive under the pre-employment test.
- (2) Provide evidence of successful completion of an approved OMP Employee Assistance Program (EAP) counseling and/or rehabilitation program.
- (3) Under go a urine drug test at the same cut-off levels required by SAMSHA, with a negative result.
- (4) Be evaluated by the Site OMP, to determine that the individual is sufficiently rehabilitated.
- (5) Provide monthly urine drug test results the first year and quarterly urine drug test results the second year following the positive test.
- (6) Signed acceptance of the terms of a rehabilitation plan by the employee as a condition of continued employment.

Violation of the terms of a rehabilitation plan or a second instance of a positive test for illegal substance or legal substance abuse will result in termination of employment. The individual will be denied access to work at the Site.

The Operating Contractor, or any other contractor, undertakes no obligation to pay for any rehabilitation, counseling, and/or treatment costs incurred by an individual under this policy.

An employee may contact the OMP's Employee Assistance Program for recommended counseling and/or treatment programs.

The Operating Contractor's Security organization will notify DOE-ID Security immediately of all MRO positive test results or other security concerns relating to an incumbent who holds, or is an applicant for, an access authorization.

#### VIII. Searches

A warrant-less search of an employee and his or her locker, work area, lunch box, personal belongings, or vehicle may be conducted at anytime, with or without reasonable suspicion, as a condition of entrance on the INEL. The employee's refusal to cooperate is grounds for termination.

#### IX. Prescription Drugs

Employees using a prescription drug which may impair mental or motor functions shall inform their supervisor of such drug use prior to starting any work under such medication. If the Manager, in consultation with Medical, determines that such use does not pose any safety or product quality risk, the employee will be permitted to work.

##### x. Report of Drug Conviction

All employees must report to their supervisor and to the Personnel Security Supervisor, in writing, any arrest or conviction under a criminal substance abuse statute for violations occurring on or off Site. This report must be made within 10 calendar days of the incident.

#### XI. Records

Records related to illegal drug use shall be maintained with maximum confidentiality and shall be provided only to MRO, contractor and DOE personnel with a need to know. Release of such records to others shall only be as permitted or required by applicable law, following consultation with Operating Contractor's Legal Services.